The Benefits of Overvaluation: Evidence from Mergers and Acquisitions

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ABSTRACT

Theoretical and empirical evidence debates on whether acquirers can exploit their overvalued equity and create value by purchasing less overvalued or undervalued target firms. Shleifer and Vishny (2003) and Savor and Lu (2009) argue in favor of this, while Fu et al. (2013) and Akbulut (2013) provide evidence against. We revisit this issue and develop a quasi-experimental design. The misvaluation effect for stock acquirers that are more overvalued than their targets is isolated and measured. Our findings offer direct evidence in favor of the Shleifer and Vishny (2003) market timing hypothesis.

Keywords: Relative misvaluation, stock, cash, difference-in-differences, Mahalanobis matching

JEL classification: G14, G30, G34

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1. Introduction

One of the theoretical predictions of Shleifer and Vishny's (2003) model argues that overvalued acquirers that purchase less overvalued or undervalued target firms by offering their overvalued equity as a means of financing serve the interests of their long-term shareholders. However, there is an ongoing debate in empirical literature on whether long-term shareholders of overvalued stock acquirers benefit from takeover activity. Savor and Lu (2009) argue in favor of Shleifer and Vishny's (2003) prediction. They compare the long-run performance of stock acquisitions with that of withdrawn stock deals. They show that withdrawn deals earn lower long-run abnormal returns than completed deals, indicating that shareholders of acquirers are better off with rather than without the acquisition. In contrast to this evidence, Fu et al. (2013) and Akbulut (2013) argue against the benefits of overvalued equity being exploited in an M&As framework. Fu et al. (2013) show that overvalued stock acquirers underperform overvalued non-acquirers in the long-run.

Given the debate and contradictory findings in the empirical finance literature, we revisit the research question of whether shareholders of acquirers benefit when employing their overvalued equity in acquiring target firms. We develop a research framework that more accurately and precisely isolates and measures the impact of overvaluation for stock acquirers. We further explain and discuss why the research frameworks of Fu et al. (2013) and Akbulut (2013) are underspecified and are not informative to draw conclusions in favour or against the market timing hypothesis of Shleifer and Vishny (2003). In Fu et al. (2013) and Akbulut's (2013) work, it is not clear whether the underperformance of overvalued stock acquirers is driven by the acquisitions effect, by the methods of payment or by the overvaluation effect. Hence, their approach is not suitable to offer evidence in

favour or against the Shleifer and Vishny's (2003) misvaluation hypothesis. Unlike, Fu et al. (2013) and Akbulut (2013), the design of our approach contributes into accounting for all forces that acquirers' share price is subject to and successfully isolates the effect emanating from offering overvalued equity. The long-run performance of overvalued stock acquirers is subject to four different forces: the misevaluation effect and three additional ones. The first one is a natural long-run stock price correction (Daniel et al., 1998; De Bondt and Thaler, 1985). Overvalued firms have the most incentive to proceed to acquisitions using stock as a means of financing the deal. A long-term downward effect is expected due to overvaluation and a stock price reversal. The second effect is a negative signaling effect. Myers and Majluf (1994) and Travlos (1987) argue that equity issuance signals negative news to the market, as investors realize that such an announcement implies that the firm is likely to be overvalued, resulting in a negative market reaction.[1] The third force is the acquisition effect itself. Empirical evidence argues that acquisitions destroy value (Loughran and Vijh, 1997; Rau and Vermaelen, 1998) in the long-run. The comparison of acquirers with non-acquirers (as in Fu et al., 2013 and Akbulut, 2013) does not take this effect into account. Finally, the fourth force is the effect of the exploitation of overvalued equity. If Shleifer and Vishny's (2003) story holds, this is expected to have a positive effect. Conclusively, overvalued stock acquirers are subject to three potentially negative forces (i.e signaling, long-run price correction, acquisition effect) and one possibly positive force (i.e. exploitation of overvalued

[1] One may argue that signalling is a short-run effect. Nevertheless, announcements of takeover deals convey important news to the market and long-run price reactions are observed. Had it not had any long-run effects, there should be no difference in cash and stock payment deals in the long –run which is not the case (Rau and Vermaelen, 1998). Markets are not always efficient. Even in more obvious cases, such as earnings announcements, a well document longer run drift is observed. If markets were strong form efficient, the signal and the news conveyed upon the announcement of earnings would have been incorporated in share price immediately. Empirical evidence indicates that a long-run drift appears after the announcement day (Bernard and Thomas, 1990). Similarly, in the case of takeovers, the announcement of deals has longer term signaling implications.

equity). The aim of this paper is to eliminate the first three forces and isolate and measure the effect of exploiting overvalued equity in an M&As framework.

We study US listed acquirers that announce completed acquisitions of listed target firms in the period 1985 to 2016. Our sample includes deals that are financed either with 100% equity or 100% cash. We adopt Rhodes-Kropf et al.'s (2005) decomposing methodology in order to identify overvalued and undervalued acquiring and target firms. Takeovers for which the acquirer is more overvalued than the target firm are classified as high relative misvaluation (high RM) deals, and all other deals are classified as low relative misvaluation (low RM) deals. We develop a quasi-experimental design and a difference-in-differences approach in an attempt to isolate, capture and measure the effect emanating from the exploitation of overvaluation in stock acquisitions. At the first stage, we compare the long-run performance of high RM stock deals with that of low RM stock deals. This first difference between the two groups captures misvaluation related effects by employing stock as a method of payment and non-valuation related effects. If Shleifer and Vishny's (2003) hypothesis holds, there should be a positive effect for high RM deals and a neutral or negative effect for low RM deals. The non-valuation related effects are mainly associated with a natural long-run price correction. High RM deals are subject to a downward price correction while low RM ones are subject to an upward price correction. The second difference is estimated between high RM and low RM cash deals. This difference captures *only* non-valuation related effects. Cash acquirers, irrespective of their relative misvaluation, are not associated with any exploitation of misvaluation benefits. Hence, the difference in performance of Cash High RM versus Low RM deals captures only the long-run price correction for the two groups. The difference of the two differences [(Stock high RM - Stock

low RM) - (Cash high RM - Cash low RM)] cancels out the non-valuation related effects and generates only the valuation effect as exploited by stock acquirers. Our difference-in-differences (dif-in-difs) estimator indicates a positive effect of around 15%-28% for a period of two to five years post acquisition announcement for firms that exploited overvaluation by undertaking stock acquisitions.

The signaling effect does not bias the difference-in-differences estimator. If stock deals convey a negative signal (Loughran and Vijh, 1997; Travlos, 1987), both high and low RM stock deals will be subject to downward pressure. Hence, the first difference between high and low RM stock acquisitions will remain unaffected. The same holds for the second difference between cash takeovers. If cash acquisitions signal neutral or positive news, both cash subsamples will be affected but the difference between them will remain unaffected. We take the assumption that the signaling effect will be equal for both high and low RM subsamples.[2] Overvalued cash acquirers may benefit by acquiring undervalued target firms. However, that happens because of the exploitation of target undervaluation not exploitation of their misevaluation and that does not affect our research framework.

On average, takeover deals have been shown to destroy market value in the long-run. The acquisition effect is also unlikely to bias the difference-in-differences estimator. We compare acquirers with acquirers. We do not compare acquirers with non-acquirers (Akbulut, 2013; Fu et al., 2013) or acquirers with failed acquirers (Savor and Lu, 2009). The long-term creation or destruction of synergies should on average be captured in all four subgroups. Even if we assume that overvaluation could incorporate elements of superior

[2] Even if we relax this assumption and accept that the negative signaling effect will be stronger for overvalued stock acquisitions, the first difference between high and low RM stock acquirers will be lower than estimated, leading to an underestimation of the dif-in-difs estimator. That would still work in favour of our findings and conclusions.

managerial skills (Tobin's Q theory), the difference between high and low RM will be affected in favor of high RM deals. However, that would hold for the differences in both stock and cash subsamples, and the difference-in-differences estimator will remain unaffected. Malmendier and Tate (2008) argue that overconfident managers who destroy value for their shareholders are more likely to use cash as a method of payment. If we assume that cash acquirers are more likely to choose acquisitions of lower quality, both high and low RM cash acquirers will be subject to this effect. However, the second difference between high and low RM cash deals will remain unaffected and therefore the difference-in-differences estimator is unlikely to be biased. Fishman (1989) argues that the medium of exchange may have valuation implication for the target firm. To account for the above acquisitions related effects, we run robustness test for premiums and operating performance. Our analysis shows that synergy gains or overpayment is unlikely to affect the dif-in-difs estimator.

A major question in the difference-in-differences research framework is whether the two groups, stock and cash acquirers, are comparable. For instance, stock acquirers are shown to be more overvalued than cash acquirers (Rhodes-Kropf et al., 2005). The descriptive statistics on misvaluation in our sample are consistent with this finding. The long-run price correction effect (the non-valuation related effect in the dif-in-difs approach) will be more pronounced for stock acquirers. To alleviate this issue, we adopt the minimum Mahalanobis distance matching technique (De Maesschalck et al., 2000). We match high RM stock acquirers with cash acquirers on the basis of the relative misvaluation measure as well as on an acquirer's misvaluation measure. We repeat the same process for low RM stock acquirers. In this way, high (low) RM cash acquirers are equally overvalued (undervalued)

with high RM stock acquirers. The reversal effect should now be equal for both stock and cash acquirers, leading to an even more unbiased dif-in-difs estimator. We further extend the Mahalanobis distance matching technique by taking into consideration a number of additional observable variables that could have affected the choice of the method of payment. Our results remain robust in favor of the hypothesis that overvaluation has positive effects for the shareholders of stock acquirers.

As a robustness check, we intensify the measure of relative misvaluation. We re-classify high RM deals as the ones for which the positive side of the RM measure is above the median or belongs in the top quartile. As the measure of relative misvaluation is intensified, the dif-in-difs estimator becomes even more positive and significant. We further control whether overvalued stock acquirers pay lower premiums and whether that could drive the positive dif-in-difs estimator, but this is unlikely to be the case. Finally, we control whether overvalued stock acquirers choose better quality deals. We provide evidence that synergistic gains do not impact on the positive dif-in-difs estimator.

Our paper draws different conclusions from Fu et al. (2013) and Akbulut (2013). Fu et al.'s (2013) study recognizes that the long-run performance of overvalued acquirers may be driven by a combination of an acquisitions related effect, such as a lack of synergy creation or overpayment, or a natural long-run price correction. To overcome these issues, they examine premiums paid to target firms. They report that overvalued stock acquirers pay higher premiums for their target firms as compared to non-overvalued stock acquirers. The main question is whether the overpayment of overvalued stock acquirers is due to acquirers' overvaluation or to the fact that acquirers pay in equity. In other words, had overvalued acquirers used cash as a method of payment, would they not have paid higher

premiums? Is overpayment attributed to the method of payment or overvaluation? In addition, in order to evaluate synergies, Fu et al. (2013) examine the operating performance of overvalued acquirers. Their findings suggest that overvalued bidders exhibit worse operating performance than non-overvalued stock acquirers. The question remains the same. Is the worse operating performance driven by overvaluation or the method of payment? What would have been the difference in operating performance between overvalued and non-overvalued acquirers, had they employed cash in the takeover process? Their findings also suggest that overvalued acquirers underperform as compared to overvalued non-acquirers. Although they control for overvaluation in the two subsamples, the effects that are captured are mixed. The question is whether stock performance is driven i) by the fact that the acquirer pays in equity, ii) because of the acquisition effect or iii) because of a signaling effect. It is well established in the academic literature that acquirers underperform as compared to non-acquirers (Loughran and Vijh, 1997; Rau and Vermaelen, 1998). Akbulut (2013) reports similar results to Fu et al. (2013). He finds that the long-term performance of overvalued stock acquirers is lower than that of overvalued non-acquirers. The question remains the same: Is the difference in stock price performance driven by the method of payment i.e. stock (signaling) or by the acquisitions effect? The difference of the two subsamples is likely to be driven by a mix of different forces and it is appropriate to provide fruitful and direct conclusions to Shleifer and Vishny's (2003) hypothesis. Both Fu et al. (2013) and Akbulut (2013) mainly refer to and examine overvalued acquirers rather than the clear effect of the exploitation of overvaluation of equity in takeover deals, as our study does.

On the other hand, our findings are consistent with Savor and Lu (2009). Savor and Lu (2009) examine a small sample of acquisitions that were initially announced but at a later stage withdrawn for exogenous reasons. They find that stock acquisitions outperform stock failed deals, implying that the long-term shareholders of stock acquirers are better off with rather than without the acquisition. The obvious question again is related to the method of payment. Is the performance difference driven by the method of payment, i.e. financing the deal with equity, or by other factors? Savor and Lu (2009) show that this relationship holds for stock but not for cash acquisitions. Their findings provide evidence in favor of Shleifer and Vishny's (2003) market timing hypothesis. However, Savor and Lu (2009) do not account for overvaluation. They assume that all stock acquisitions are driven by a misvaluation difference, while this is not the case. Our findings indicate that a proportion of stock-financed takeovers are not driven by overvaluation. Either the acquirer is not overvalued or the acquirer is less overvalued or more undervalued than the target firm. The sample of failed acquisitions is relatively small. While they provide evidence in favor of overvalued stock acquirers, our difference-in-differences approach more accurately captures and measures the benefits to long-term stock acquirers.

This paper contributes to the literature in several ways. First, we propose a difference-in-differences approach which disentangles, captures and measures the effects emanating from the exploitation of overvaluation in stock acquisitions. Second, we provide answers on the reasons of the debate in the literature. Fu et al. (2013) and Akbulut (2013) reach different conclusions simply because they do not account for various effects, such as signaling or the acquisition effect related to overvalued stock acquirers. Our research framework shows that the negative long-run performance of overvalued stock acquirers is

mainly driven by a signaling and a stock price reversal effect, while the exploitation of overvalued equity contributes positively and serves as a form of resistance to downward price pressures. Third, we provide direct evidence in support of Shleifer and Vishny's (2003) market timing theory. We find that there are positive market timing effects for overvalued stock acquirers. The negative performance of stock acquirers can be attributed to effects other than the exploitation of overvalued equity.

Our work is closely related to the studies of Akbulut (2013), Ben-David et al. (2014) and Fu et al. (2013). Unlike these studies, which investigate the behaviour of overvalued stock acquirers and capture a combination of effects, we disentangle and measure the effect related to the exploitation of overvalued equity only. This study also relates to the study of Savor and Lu (2009). While they also offer positive evidence in favor of the market timing hypothesis, our study more accurately captures this effect. From an empirical point of view, our work offers answers to the theoretical predictions of Shleifer and Vishny (2003) and addresses the debate and conflicting evidence around the market timing hypothesis. Finally, this paper fits with the studies of Myers and Majluf (1984) and Travlos (1987), and even more closely with Golubov et al. (2015). Our results indicate that despite the positive effects of exploiting overvalued equity, the informational content of stock acquisitions and the news signalled to the market is a strong determinant of the final effects of the shareholder wealth of stock acquirers. Golubov et al. (2015) disentangle the informational content and the acquisition effect of stock acquirers in order to understand the short-run market reaction upon the announcement of these acquisitions. They conclude that stock takeovers are not value destroying projects net the signaling effect. In this paper, we

disentangle four effects in order to be able to draw fruitful conclusions with regards to the effects of exploiting overvalued stock in an M&As framework.

2. Sample

Our sample consists of US takeovers announced between January 1, 1985, and December 31, 2016. Takeover deals were collected from Thomson Security Data Corporations (SDC). For a deal to be included in our sample, it needs to meet the following criteria:

- Both the acquirer and the target firm are US listed firms.
- The acquiring firm purchases at least 50% of the shares of the target firm.
- The deal value is at least $10 million.
- The deal value represents at least 1% of the acquirers' market value of equity.
- The acquisition is financed by either 100% stock or 100% cash.
- Both the acquiring and target firms have positive book values of assets the year before the announcement of the deal.

The final sample consists of 2,352 takeover deals, out of which 1,546 are fully equity financed and 896 are cash-financed deals. Table 1 reports the number of deals per year and by the method of payment employed. Our results are consistent with prior evidence. There is an increase in takeover deals in the period 1997-2001, when the so-called dotcom bubble

occurred. This period is characterized as one of the largest merger waves in the history of M&As. Cash-financed acquisitions are mostly observed in the '80s, during the 1998-99 merger wave, while when markets are highly overvalued, many more equity-financed acquisitions take place. A small merger wave is observed in 2006-2007. This is a period of higher liquidity and low interest rates in the markets, and as a result more cash acquisitions take place. After 2001, we observe a decline in stock deals which is in line with deBodt et al. (2015).

[Insert Table 1 about here]

3. Measuring Acquirer and Target Relative Misvaluation

One of the major requirements of our research set-up is to identify stock acquirers motivated by overvaluation. According to Shleifer and Vishny (2003), a necessary condition for acquirers to exploit their stock is that target firms need to be less overvalued or more undervalued than acquirers.

To identify acquirers' and targets' misvaluation, we employ Rhodes-Kropf et al.'s (2005) methodology in decomposing a firm's market-to-book value ratio into two components: the market-to-value and the value-to-book component:

$$Ln\left(\frac{M}{B}\right) = Ln\left(\frac{M}{V}\right) + Ln(\frac{V}{B}) \qquad (1)$$

Where M is the market value of equity, B is the book value of equity and V is the true value of equity. While market and book value can be directly observed from the company's statements, the intrinsic value (V) is unobservable. The intrinsic value (V) can be calculated as a linear function of book value of equity, net income and leverage.[3] In order to capture

[3] Further details on the decomposing process and the estimation of the intrinsic value can be found in Rhodes-Kropf, Robinson and Viswanathan's (2005) paper. A neat and simple description of this methodology can also be found in the Appendix of Fu et al. (2013). We closely follow this approach.

variation in investment opportunities across industries and over time, the parameters of the linear function are allowed to vary across industries and over time. The function is described as follows:

$$Ln(M_{i,t}) = \alpha_{0,j,t} + \alpha_{1,j,t}Ln(B_{i,t}) + \alpha_{2,j,t}Ln(|NI_{i,t}|) + \alpha_{3,j,t}I^{-}Ln(|NI_{i,t}|) + \alpha_{4,j,t}\left(\frac{D}{V}_{i,t}\right) + \varepsilon_{i,t} \quad (2)$$

Where $NI_{i,t}$ is the Net Income of firm I at time t, I^{-} is a dummy variable that takes the value of one for firm-years with negative net income and zero otherwise. $\frac{D}{V}_{i,t}$ is the leverage ratio for firm I at time t. Subscript j denotes the various industries. The variation of the market value that cannot be explained by the above factors is captured in the error term and acts a natural component of misevaluation.

We then run cross-sectional regressions of Equation (2) for each year to estimate the $\alpha_{,j,t}$ parameters for each industry according to Fama and French (1997) industry classification. The explanatory power of equation (2) is high with R squares above 80%. Following Rhodes-Kropf et al. (2005) approach, the long-run alpha parameters are estimates as $\overline{\alpha_j} = \frac{1}{T}\sum_t \hat{\alpha}_{j,t}$. The final measure of misevaluation is the following:

$$Ln\left(\frac{M}{V}\right) = Ln(M_{i,t}) - [\overline{\alpha_{0,J}} + \overline{\alpha_{1,J}}Ln(B_{i,t}) + \overline{\alpha_{2,J}}Ln(|NI_{i,t}|) + \overline{\alpha_{3,J}}I^{-}Ln(|NI_{i,t}|) + \overline{\alpha_{4,J}}\left(\left(\frac{D}{V}\right)_{i,t}\right)] \quad (3)$$

The component of interest for our study is the $Ln(\frac{M}{V})$, which captures misvaluation. It denotes the market's perception of the value of the company over the true value of the company. Higher values of the $Ln(\frac{M}{V})$ratio would indicate higher overvaluation. The Rhodes-Kropf et al. (2005) decomposition methodology has been predominantly used in the literature (Fu et al., 2013; Elliot et al., 2008; DeAngelo et al., 2010, Eckbo et al., 2017).

Table 2 presents the different ratios that compose the Rhodes-Kropf et al. (2005) decomposition formula, 42 days and 1 day before the announcement date. We follow Fu et

al. (2013) and compute misvaluation measures 42 days before the acquisition announcement in order to avoid market anticipation and information leakage effects. Especially for target firms, about a month prior to the announcement of a takeover, a high price run-up has been observed (Schwert, 1996). The market-to-value ratio for bidders as estimated 42 days prior to the acquisition announcement is higher than that of their targets, indicating that acquiring firms are more overvalued than their targets. Stock bidders appear to be more overvalued compared to cash bidders (0.704 versus 0.462). Although stock targets also appear to be overvalued, they are less overvalued than their bidding firms (0.112 versus 0.704). Closer to the announcement date (one day prior to the announcement date), target firms' overvaluation increases, which depicts an increase in their market value driven by the expected price run-ups prior to the announcement. The market-to-book value ratio depicts similar evidence. Acquirers are more overvalued than targets, stock acquirers are more overvalued than cash acquirers and stock acquirers are more overvalued than stock targets. The above findings are consistent with the existing empirical literature (Rhodes-Kropf et al., 2005; Fu et al., 2013; Akbulut, 2013; Ang and Cheng, 2006), confirm prior findings and suggest that our approach and estimations are consistent with existing evidence. While there is a consensus in the literature with respect to these facts, there is debate on whether shareholders of overvalued stock acquirers benefit from misvaluation differences between acquiring and target firms.

[Insert Table 2 about here]

According to the theoretical prediction of Shleifer and Vishny (2003), a bidder would benefit from relative misvaluations if it acquires an undervalued or less overvalued target firm. Even a fairly valued bidder that acquires an undervalued target firm should

theoretically benefit if the transaction is financed with equity. Therefore, what is important for our research framework is not the actual misvaluation of the acquirer and the target but their relative misvaluations. To capture this effect, we construct a relative misvaluation measure (RM) which captures the difference between the bidder's and target's misvaluation:

$$RM_i = Ln\left(\frac{M}{V}\right)_{Bidder} - Ln\left(\frac{M}{V}\right)_{Target} \quad (4)$$

Where RM is the relative misvaluation of a takeover, $Ln\left(\frac{M}{V}\right)_{Bidder}$ is the bidder's misvaluation and $Ln\left(\frac{M}{V}\right)_{Target}$ is the target's misvaluation 42 days before the acquisition announcement.[4] We identify three groups of acquisitions. Deals for which the relative misvaluation is much higher than zero indicate that the acquirer is more overvalued or less undervalued than the target, and an acquirer could theoretically benefit by employing equity as a method of payment. Deals for which the relative misvaluation is zero (or close to zero) indicate that the acquirer is equally misvalued (or fairly valued) as the target and no relative misvaluation effects can be exploited. Finally, deals for which the relative misvaluation is much lower than zero indicate that the acquirer is less overvalued or more undervalued than the target firm and, theoretically, negative effects are generated by purchasing target firms using equity as a method of payment.

For our analysis, we split takeovers into two groups: those that could theoretically benefit and those that would not benefit from relative misvaluations. Takeovers for which the relative misvaluation measure (RM) is higher than the first quartile of the positive values of RM are classified as high RM deals. These are deals in which a stock bidder could

[4] Our results are robust if we employ bidder's and target's misvaluation one day before the acquisition announcement.

theoretically take advantage of relative misvaluation. Takeovers for which the relative misvaluation measure (RM) belongs in the bottom quartile of the positive values of RM[5] or is negative are classified as low RM deals. These are deals in which a stock bidder could not take advantage of relative misvaluations.

The descriptive statistics of our sample indicate that almost 38% of stock acquisitions classified as low RM are not motivated by misvaluation. Fu et al. (2013) take a stricter approach in the classification of relative misvaluation and report similar results. 31% of their stock sample is not motivated by misvaluation. Savor and Lu (2009) do not account for this fact in their analysis. They assume that all stock acquisitions are motivated by bidders' overvaluation.

4. The Impact of Exploiting Overvaluation – A Difference-in-Differences Framework

Examining the effects associated with overvalued stock acquirers is a complicated task. By simply estimating a long-run performance measure for acquirers that are overvalued and finance their deals by equity, we would not be able to draw fruitful conclusions about the quality of the acquisition or whether employing overvalued equity in the acquisition process has positive, neutral or negative effects for the shareholders of the bidding firm. The fundamental reason for that lies in the fact that the share price performance of overvalued stock acquirers is subject to four different forces. The main

[5] Takeovers for which the relative misvaluation measure (RM) belongs in the bottom quartile of the positive values of RM or in the top quartile of the negative values of RM are perceived to be deals for which the relative misvalution is close to zero, i.e. the bidder's and target's misvaluation is more or less similar. Our results remain robust even if we classify deals as high (low) RM if the RM is higher (lower) than zero. We take this approach in order to have a slightly larger sample of low RM deals and more meaningful statistical tests.

focus of this paper is to disentangle these effects and isolate and measure the effect of exploiting overvalued equity in takeover deals.

First, overvalued acquirers are subject to a natural long-run price correction. There are periods when firms may be misvalued for some time, but in the longer run, the market will drive prices down to fundamentals (Daniel et al., 1998; De Bondt and Thaler, 1985). A long-run reversal is expected and will have a negative impact on the share price of overvalued acquirers. Second, the share price performance of stock acquirers will also be negatively affected by a signaling effect. Issuing equity in order to pay the shareholders of the target firm conveys negative news to the market about the valuation of the firm (Myers and Majluf, 1994; Travlos, 1987). Signaling is important in the M&A process. Golubov et al. (2015) show that stock acquisitions are not value-destructive projects if the signaling effect emanating from the method of payment is isolated. Signaling has long-term implications for the share price of acquirers. Studies (Rau and Vermaelen, 1998) find that long-run performance differences between cash and stock acquisitions. Third, the share-price performance of acquirers is influenced by the quality of the acquisition itself. To measure the quality of the takeover, we refer to the combination of synergies to be created and the amount paid to the shareholders of the target firm. If the acquirer pays less (more) than the sum of the value of the target firm and synergies to be created, the market should perceive the deal favorably (less favorably). Empirical evidence on M&As (Loughran and Vijh, 1997; Rau and Vermaelen, 1998) shows that, on average, acquirers destroy value for their shareholders. The fourth effect that impacts the long-run performance of overvalued stock acquirers is the exploitation of their overvalued equity, if Shleifer and Vishny's (2003) predictions hold.

Calculating the long-run performance of acquirers that exploit relative misvaluations and purchase less overvalued or more undervalued target firms by paying in equity is a combination of the four forces described above. In order to isolate, capture and measure the effect of the exploitation of relative misvaluation for acquirers that use equity as a method of payment in the takeover process, we develop a difference-in-differences research framework. The first difference represents the long-run share price performance between High and Low relative misvaluation stock acquirers. This difference captures misvaluation related effects and non-valuation related effects. If Shleifer and Vishny's (2003) theoretical predictions hold, high RM stock acquirers are positively affected by exploiting their equity, while for low RM stock acquirers there is either a neutral or negative effect. The non-valuation related effects are mainly associated with a natural long-run price correction for overvalued and undervalued acquirers. High RM deals are subject to a downward price correction while Low RM deals are subject to an upward price correction. The second difference is calculated between high RM and low RM cash deals. This difference captures *only* non-valuation related effects. Cash acquirers, irrespective of their relative misvaluation, are not associated with any exploitation or lack of misvaluation benefits. Hence, the difference in the performance of high and low RM cash deals captures only the long-run price correction for the two groups. The difference of the two differences [(high RM Stock - Low RM Stock) - (high RM Cash - Low RM Cash)] cancels out the non-valuation related effects and generates only the valuation effect as exploited by stock acquirers. Figure 1 depicts the difference-in-differences research framework.

[Insert Figure 1 about here]

We compute the long-run performance of acquirers by estimating market-adjusted buy-and-hold abnormal returns[6]:

$$BHARs_i(0,T) = \prod_{t=0}^{T}\left(1 + R_{i,t}\right) - \prod_{t=0}^{T}(1 + R_{m,t}) \qquad (5)$$

where $BHARs_i(0,T)$ is the buy-and-hold abnormal returns for acquirer i from time t=0, which is the month of the acquisition announcement, to month T. T is the holding period, $R_{i,t}$ is the monthly return for acquirer i in month t and $R_{m,t}$ is the Datastream value-weighted market index for the US market.

Table 3 presents BHARs for 12, 24, 36 and 60 months following the announcement of the acquisition. The difference between high and low RM stock acquisitions is positive and significant for the holding periods of 12, 24 and 36 months. High RM stock acquirers are subject to a downward pressure due to their overvaluation and to a positive effect due to the exploitation of overvaluation, while low RM stock acquirers exhibit an upward price correction due to their undervaluation and a neutral or negative effect due to the fact that they do not exploit misvaluation. The difference in performance between the two stock subsamples is formed by two opposing forces: the exploitation of relative misvaluation and a reversal price correction effect. The positive difference in favor of high RM stock acquirers indicates that the exploitation of misvaluation exists, and serves as a form of resistance in the deflation of share prices of overvalued acquirers that employ equity in purchasing less overvalued or more undervalued target firms. The difference between high and low RM stock acquisitions becomes insignificant for the buy-and-hold abnormal returns for a holding period of 60 months. That can be attributed to the fact that the reversal effect is fully redeployed. The question is, what would have been the difference between high and low

[6] Rosen (2006), Fu et al. (2013) and Ritter and Welch (2002) are some of the papers that use this methodology.

RM acquirers had they not exploited (for high) or not exploited (for low) their equity? In other words, how much is the reversal effect on its own? We can proxy and capture that effect if we observe the difference in the long-run performance between high and low RM cash acquirers. This difference captures only the long-run price correction effect, as cash acquirers are not associated with any exploitation or not of misvaluations, irrespective of their relative misvaluations. If we subtract the reversal effect as captured by the difference in cash acquisitions from the difference in stock acquisitions, the net effect represents the exploitation of stock in high RM deals versus the non-exploitation of stock in low RM deals.

Table 3 depicts the difference-in-differences (dif-in-difs) estimator for 1, 2, 3 and 5 years post acquisition announcement. The dif-in-difs estimator is positive and significant for the holding periods of 24, 36 and 60 months. It is positive but insignificant for the 12-month holding period. This is due to the fact that the reversal effect had not been fully redeployed within one year. These findings indicate that Shleifer and Vishny's (2003) theoretical predictions hold. We report that the exploitation of overvalued equity in mergers and acquisitions has beneficial effects for the long-term shareholders of the acquiring firm.

[Insert Table 3 about here]

The difference-in-differences technique is used to measure the effect of a treatment after controlling for other effects through a control group. The treatment group is affected by the treatment, while the control group is not (Roberts and Whited, 2012). In our case, the treatment group is the stock acquisitions group and the control group is the cash acquisitions group. In a regression framework, the difference-in-differences technique can be described as follows:

$$Bidder\ Performance = \beta_0 + \beta_1 Stock + \beta_2 High + \beta_3 Stock * High + \varepsilon_i \qquad (6)$$

where Bidder Performance is a long-run performance measure (BHARs), stock is a dummy variable that takes the value of one if the bid was paid with stock and zero otherwise, High is a dummy variable that takes the value of one if the bid was classified as a high RM deal as described in Section 3 and zero otherwise, and Stock*High is the interaction term. The coefficient of the interaction variable β_3 captures the misvaluation effect. Our hypothesis implies that if stock acquirers benefit by timing the market and bidding for less overvalued or more undervalued target firms, the β_3 coefficient should be positive and significant.

Table 4 presents results of the difference-in-differences estimator in a regression framework. The dependent variable is BHARs for the different holding periods. Apart from the Stock and the High dummy variables, we control for a number of variables that may affect acquirer performance. In regressions (2), (4), (6) and (8), we control for year and industry fixed effects. In all regressions, throughout the analysis, standard errors are clustered by industry and year (Petersen, 2009). The main variable of interest is the interactive term between the stock dummy and the high relative misvaluation dummy (Stock*High). The interactive term is positive and significant for the holding periods of 24, 36 and 60 months, and positive but not significant for the 12-month holding period. These findings further support the results presented in the univariate analysis of the dif-in-difs approach.

[Insert Table 4 about here]

Signaling is unlikely to bias the dif-in-difs estimator. Travlos (1987) argues that stock acquirers convey negative news to the market. Both high and low relative misvalation (RM) stock deals will be subject to a negative effect. We assume that the signaling effect will be of

equal magnitude for both high and low RM stock acquisitions. Hence, the first difference will not be affected. Cash acquisitions are expected to have a non-negative effect (Travlos, 1987), either because they do not signal overvaluation or because they convey managerial confidence about the future prospect of the acquisition. The signaling effect is likely to be similar for both high and low RM cash deals. As a result, the second difference will also not be affected and the dif-in-difs estimator is not likely to be influenced by the signaling effect of the method of payment.

Finally, the effect driven by the quality of the acquisition itself is unlikely to bias the dif-in-difs estimator. In our research set-up, we compare acquirers with acquirers. All sub-groups are subject to the acquisition effect. Nevertheless, let's assume managers who suffer from hubris are more likely to be observed in cash acquisitions (Malmendier and Tate, 2008). Overconfident managers, on average, perform lower quality deals either because they overestimate synergies or overpay. This effect will not influence the dif-in-difs estimator, as it will be cancelled out in the second difference between high and low cash acquisitions. In addition, if we take the Tobin's Q approach of high market-to-value acquirers and assume that overvalued acquirers may exhibit elements of higher quality management, that would still not affect our dif-in-difs estimator. Servaes (1991) shows that high Q bidders generate higher returns. If high RM deals exhibit better managerial quality skill elements, the difference between high and low RM deals will be biased in favor of high RM acquisitions. However, that will be the case for both stock and cash acquisitions. This bias will be eliminated in the difference of the differences of the two subgroups. In sections 7 and 8, for robustness reasons, we check whether acquisition premium or synergy gains are likely to drive our dif-in-difs estimator. We do not find any such evidence. Comparing the

long-run performance of acquirers with that of non-acquiring firms is not the most appropriate framework within which to draw conclusion on the misvaluation effects, as this comparison captures a number of different effects. One is an acquisition quality effect, a second is a signaling effect and a third is the exploitation of overvalued equity if the sample refers to stock acquisitions. Takeovers are major corporate events which attract investors' attention, and the signals conveyed to the market are important in re-evaluating firms. Non-acquiring matched firms are exposed to neither an acquisition effect nor a signaling effect. Hence, the difference between acquirers and non-acquirers is the sum of both of these effects. If we refer to stock acquirers, the difference would also capture the exploitation of overvalued equity in addition to the other two effects. Therefore, employing non-acquiring firms as a control sample is not always the most appropriate approach, especially if the aim is to test Shleifer and Vishny's (2003) theoretical predictions.

Fu et al. (2013) examine the long-run share price performance of overvalued acquirers versus overvalued non-acquiring firms and report that acquirers underperform non-acquirers. They do not distinguish between stock and cash acquirers. While they control for overvaluation, the difference in performance is a mixture of a great deal of effects, such as acquisition quality, signaling and exploitation of overvalued equity. Akbulut (2013) compares stock acquirers with similarly misvalued non-acquiring firms and finds that acquirers underperform is mainly driven by highly overvalued acquirers. The difference in performance is again a combination of the acquisition effect, signaling and exploitation of overvalued equity. The more pronounced results against overvalued acquirers are likely to be driven by two effects: first, overvalued acquirers are more likely to be infected by hubris, leading to worse quality acquisitions. Second, the signaling effect is likely to be stronger for

overvalued stock acquirers. Non-acquiring firms may be overvalued of a similar magnitude, but by taking no corporate action, they do not reveal any news to the market about their misvaluation. Finally, the exploitation of overvalued equity in favor of acquirers does not seem to be high enough to counterbalance the other two negative effects. In any case, the difference in performance, which is a combination of three different effects, is not informative enough to draw fruitful conclusions about the effects of exploiting overvaluation or not. The studies of Fu et al. (2013) and Akbulut (2013) conclude that acquirers destroy more value for their shareholders as compared to non-acquirers after controlling for misvaluation. However, their research frameworks are not informative enough to provide direct evidence in favor of or against the market timing hypothesis of Shleifer and Vishny (2003). Prior studies (Loughran and Vijh, 1997) have already established this finding. Our findings provide direct evidence that paying with overvalued equity serves as resistance against the deflation of overvalued acquirers.

5. Are Stock Acquirers Comparable to Cash Acquirers?

One of the main questions associated with the difference-in-differences approach is whether stock acquirers are comparable to cash acquirers. Do acquirers' characteristics impact the decision of the method of payment to be employed in the M&A process? Empirical evidence shows that acquirers, when overvalued, are more likely to use equity as a means of financing their acquisitions (Rhodes-Kropf et al., 2005; Dong et al., 2006; Ang and Cheng, 2006; Ben-David et al., 2014). Our descriptive statistics on the misvaluation of

acquirers also confirms this evidence and shows that stock acquirers are more overvalued than cash acquirers. One of the main effects that the dif-in-difs approach aims to capture is the reversal effect, as proxied by the reversal that takes place for high versus low RM cash acquirers. Since stock acquirers are more overvalued than cash, the reversal effect should be more pronounced for the stock subsample. To alleviate this problem, we employ the minimum distance Mahalanobis matching technique[7] in order to identify cash acquirers that are comparable to stock acquirers in terms of their relative misvaluation and also acquirers' misvaluation. This technique deals with selection bias based on observable characteristics by minimizing the number of standard observations in a multidimensional space between stock and cash acquirers. At the first stage, we identify one cash acquirer that matches each high RM stock acquirer on the basis of the relative misvaluation measure. We repeat the same process for low RM acquirers. We identify one cash acquirer that matches each low RM stock acquirer on the basis of the relative misvaluation measure. In this way, high RM stock and cash acquirers as well as low RM stock and cash acquirers are exposed to the same level of relative misvaluation. In Panel A of Table 5, we report the regression analysis results. The interactive term Stock*High remains positive and significant for all holding periods. We repeat the same process and we now match stock with cash acquirers on the basis of the relative misvaluation variable and acquirers' misvaluation as well (Panel B). The dif-in-difs estimator remains positive and significant. The results are robust even without controlling for industry and year fixed effects. In untabulated results, we repeat the same process, where we identify five and ten cash acquirers for each high or low stock acquirer, respectively. The results remain robust.

[7] Our results remain robust if we achieve appropriate matches by using propensity score matching methodology

[Insert Table 5 about here]

Relative misvaluations and acquirers' misvaluation are the obvious characteristics on which stock and cash acquirers are likely to differ. In addition, we control for a number of extra characteristics which may influence the choice of the method of payment (Faccio and Masulis., 2005). We repeat the Mahalanobis matching technique as described above and we match stock with cash acquirers based on variables such as cash to total assets, return on equity, sales growth, debt-to-equity ratio, price-to-earnings ratio, total assets, bidder performance in the year before the acquisition, the standard deviation of bidder daily returns in the year prior to the acquisition, the relative size of the deal measured as the deal value over the market value of bidder's equity, the market-to-book value ratio of the bidder as measured 42 days prior to the acquisition and the actual level of debt. Vermaelen and Xu (2014) and Uysal (2011) show that the capital structure of the firm matters in the acquisition decision process. Pinkowitz et al. (2013) argue that cash rish firms are less like to perform cash than stock takeovers. Further details on the construction of the variable can be found in the Appendix in Panel C.

The results of the regression analysis are presented in Table 6. Panels A, B and C present one, five and ten matchings of cash acquirers for each stock acquirer respectively. The variable of interest is the interactive term Stock*High, which is positive and significant for the 24-, 36- and 60-month holding periods, indicating that the effect for stock acquirers that take advantage of higher relative misvaluations is positive. The results for the 12-month holding period are positive but not significant. The exploitation of relative misvaluations for stock acquirers serves as resistance to the deflationary effect of overvalued acquirers, and more time is required for the reversal effect to be redeployed. The results reported in

Section 4 are robust even after we match stock with cash acquirers on a number of observable characteristics that could have affected the choice of the method of payment.

[Insert Table 6 about here]

6. Intensify Relative Misvaluations

The classification of high versus low RM deals is described in Section 3. We classify deals as high RM if the relative misvaluation measure (RM) is higher than the first quartile of the positive values of RM. If the proposed research framework in this study captures misvaluation benefits for stock acquirers, as it claims, the effects would be even more pronounced if we examined deals for which the misvaluation difference between bidders and targets is even higher. For robustness, we intensify the measure of relative misvaluation and reclassify deals as high RM deals if the RM measure is higher than the median (Panel A of Table 7) or belongs in the top quartile of the positive values of the RM measure (Panel B of Table 7). Results are presented in Table 7. We employ the Mahalanobis matching technique with all control variables as described in Section 5. All regressions include year and industry fixed effects. Standard errors are clustered by industry and year. The results become stronger and more pronounced as we intensify the definition of high RM. The coefficients for the interactive term (Stock*High) are -0.003, 0.093, 0.177 and 0.232 for the four holding periods of 12, 24, 36 and 60 months, respectively, with the initial definition of the high RM dummy (the RM is higher than the first quartile of the positive values of RM – see Table 6, regressions (1), (2), (3) & (4)). When we intensify the definition of high RM and keep deals for which the RM is higher than the median of the positive values of RM, the coefficient of the interactive term (Stock*High) becomes even more positive and even more

significant. It is 0.063 (insignificant at the 25% level), 0.137, 0.296 and 0.289 for the holding periods of 12, 24, 36 and 60 months, respectively (Panel A of Table 7). The coefficients increase in magnitude even more if we further intensify the definition of high RM as those for which the RM measure belongs in the top quartile of the positive values of RM. The coefficients of the interactive term (Stock*High) are 0.158 (significant), 0.189, 0.370 and 0.458 for the holding periods of 12, 24, 36 and 60 months, respectively (Panel B of Table 7). Our findings indicate that the higher the relative misvaluation between acquiring and target firms, the higher the benefits associated with the employment of stock as a method of financing takeover deals.

[Insert Table 7 about here]

Our findings provide direct evidence that paying with overvalued equity serves as resistance against the deflationary forces of overvalued acquirers. Are the shareholders of overvalued stock acquirers better off than those of non-acquiring firms? Fu et al. (2013), Akbulut (2013) and Ben-David et al. (2014), as well as prior literature, indicate that this not the case. Are the shareholders of overvalued stock acquirers better off than those of cash overvalued acquirers? In untabulated results, the univariate analysis results show that the long-run performance of high RM stock deals is not statistically different from that of high RM cash deals after matching acquirers on the characteristics discussed above or after intensifying the measure of misvaluation. Does this mean that taking advantage of overvalued equity to acquire less overvalued or more undervalued target firms does not serve the long-term interests of bidders' shareholders? No, this is not the case either. The performance of overvalued acquirers depends on many more effects apart from this one. Our study helps to shed light on the forces that drive the underperformance of overvalued

stock acquirers. If anything should not be blamed, it is the exploitation of equity overvaluation. Our results indicate that signaling plays an important role in determining the performance of overvalued stock acquirers. The main effects that differ between high RM stock and high RM cash deals are the following: stock deals convey negative news while cash deals do not, and stock deals benefit by paying with their overvalued equity while cash ones do not. The fact that the performance difference between high RM stock and cash acquirers is statistically insignificant indicates that the two opposing forces cancel one another out, proving that the benefits of exploiting overvaluation are cancelled out by the negative signaling effect. Cash acquirers or non-acquiring companies that do not convey much news to the market about their valuation remain overvalued for longer.

7. Do Overvalued Stock Acquirers Overpay?

One of the assumptions of the difference-in-differences framework is that the acquisition quality effect does not bias the dif-in-difs estimator, as discussed in Section 4. In this section and the following one, we account for this assumption. We test whether the positive effect of exploiting overvalued equity in favor of overvalued acquirers is driven by underpayment or by performing better quality acquisitions. Fu et al. (2013) argue that overvalued stock acquirers overpay for their targets. If this is the case, that would work in favor of the dif-in-difs estimator. However, the research framework of Fu et al. (2013) differ from ours, as they capture an overvaluation effect only and we cannot draw fruitful conclusions about overvalued stock acquirers. They show that the premiums offered by overvalued stock acquirers are significantly higher than those offered by undervalued stock acquirers. This finding is quite expected. Overvalued acquirers, which are more likely to be

infected by hubris or have higher growth opportunities, are more likely to overpay. The natural question that arises is whether the overpayment is driven by the fact that the acquiring firm is overvalued or due to the method of payment. In other words, had overvalued acquirers employed cash as a method of payment, would they have not overpaid?

To empirically examine this issue, we calculate acquisition premiums by using two measures. We estimate target firms' cumulative abnormal returns around the acquisition announcement date as:

$$Target\ CARs(-t_1, +T) = \sum_{-t_1}^{T}(R_{i,t} - R_{m,t}) \qquad (7)$$

where Target CARs(-t,+T) is target cumulative abnormal returns from t_1 days before the announcement of the deal up to T days after the announcement, $R_{i,t}$ is the target firm's return on day t and $R_{m,t}$ is the Datastream value-weighted market index for the US market. As a first measure, We follow Schwert (1996) and estimate target cumulative abnormal returns for the period 42 days prior to the acquisition date up to the completion day (CD) $[Target\ CARs(-42, +CD)]$. As a second measure, we estimate target cumulative abnormal returns for the period one day prior to the acquisition date up to one day after the announcement $[Target\ CARs(-1, +1)]$ (Fu et al., 2013). Premium measures based on stock exchange ratios are not appropriate for our research framework, as we need to estimate premiums for cash acquirers as well.

In order to answer the question of whether overvalued stock acquirers overpay because of their overvaluation or because of the method of payment, we apply the difference-in-differences framework as described above. Each cash acquirer is matched with each stock acquirer by employing a Mahalanobis matching technique based on all the

variables as described in Section 5. Table 8 presents the one-to-one matching approach. In unreported results, we match each of the stock acquirers with five and ten cash acquirers and the findings remain robust. Table 8 presents the univariate results for the two acquisition premium measures (Panels A and B). Findings for the overall sample indicate that overvalued acquirers overpay as compared to their non-overvalued counterparts, as expected. This holds for both stock and cash acquirers. Targets of high RM stock acquirers receive 15.93% (statistically significant at the 1% level) higher abnormal returns compared to targets of low RM stock acquirers for the longer period acquisition premium measure (CARs(-42,CD)), while for the shorter-term measure (CARs(-1,+1)), the difference is 5.67% (statistically significant at the 1% level). Fu et al. (2013) present very similar results. They report an acquisition premium difference of 15.85% and 5.46% respectively for the two measures in favor of overvalued stock acquirers. The question is whether overvalued cash acquirers overpay. Findings in Table 8 show that high RM cash acquirers also overpay as compared to low RM cash acquirers. The interesting finding is that cash acquirers overpay by more as compared to the difference estimated in the stock subsample. The difference in premiums for the targets of high versus low RM cash acquirers is 21.12%, for the longer-term measure, and 14.85% for the shorter-term measure. The difference of the differences is -5.20% and -9.17% for the two measures, respectively. That implies that stock acquirers overpay because they are overvalued, but would have overpaid much more had they used cash. It is overvaluation that drives overpayment and not the fact that they employed stock as a means of financing.

[Insert Table 8 about here]

Table 9 presents the multivariate regression analysis results for acquisition premiums. We control for a number of variables which could have affected premiums. Further details on the construction of the control variables can be found in the Appendix, in Panel B. The results offer similar conclusions. The interactive term (Stock*High) is negative and significant for both measures of acquisition premiums, suggesting that although stock acquirers overpay, they would have paid even higher premiums had they employed cash to finance the acquisition. Panels A, B and C presents results for one-to-one, one-to-five and one-to-ten matches between stock and cash acquirers. In all regressions, we control for industry and year fixed effects. Standard errors are clustered by industry and year. The results remain robust even if we do not control for year and industry fixed effects.

[Insert Table 9 about here]

Following the findings on acquisitions premiums, the question that arises is the following: Is the positive BHARs dif-in-difs estimator reported in previous sections driven by the fact that overvalued acquirers overpay less than what they could have paid had they used cash? To account for that issue, we control for acquisition premiums by matching stock with cash acquirers on this dimension. The Mahalanobis matching technique, as described in previous sections, is used to match each cash acquirer with each stock acquirer on the basis of acquisition premium. By doing so, both stock and cash acquirers are comparable in terms of premiums, as they offer the same amount to their target firms. Panel A of Table 10 presents the multivariate regression analysis results for buy-and-hold abnormal returns (BHARs) after each stock acquirer is matched with one cash acquirer based on the Target CARs(-42,CD) variable. The dependent variable is BHARs for the different periods. The variable of interest is the interactive term (Stock*High), which captures the dif-in-difs

between the two subsamples. The interactive variable is positive and significant, indicating that premiums are unlikely to affect the dif-in-difs estimator. We repeat the same process by matching stock with cash acquirers based on premiums and all other variables (Panel B) as described in Section 5. The results remain quantitatively similar and not affected by premiums. We re-run our analysis by using Target CARs(-1,+1) as the matching variable. Findings are presented in Panels C and D of Table 10. In untabulated results, we match each stock acquirer with five or ten cash acquirers and the overall picture is similar.

[Insert Table 10 about here]

8. Do Overvalued Stock Acquirers Perform Better Acquisitions?

The findings presented in the section above indicate that although overvalued stock acquirers do not overpay as much as they would have if they had used cash as a means of financing the deals, this factor does not seem to drive the positive effects emanating from the exploitation of overvalued equity. Apart from the payment involved in a transaction, the synergies created from a takeover deal are important in understanding the quality of the acquisition. The aim of this section is to examine the synergies created by overvalued stock acquirers and whether this affects and drives the positive dif-in-difs estimator reported in favor of overvalued stock acquirers. To investigate synergies created (or not) by the various subgroups, we examine the operating performance following takeover deals. We follow Healy et al. (1992), and the main measure of operating performance is Earnings Before Interest Taxes and Depreciation (EBITDA) divided by total assets. The measure of Operating Return on Assets (ROA) is decomposed into Operating Profit Margin, calculated as EBITDA divided by sales, and asset turnover calculated as sales divided by assets.

$$Operating\ ROA = \frac{EBITDA}{Assets} = \frac{EBITDA}{Sales} x \frac{Sales}{Assets} \qquad (8)$$

We calculate the pre and post abnormal performance (operating ROA, operating profit and asset turnover) for the merged firms. In the period prior to the acquisition, performance is calculated as the market value weighted average of the target's and acquiring firm's performance. We also calculate the industry median performance of the acquirer's and the target's industry, and a market value weighted average is estimated. Abnormal performance is estimated as the difference between the market value weighted average of the bidder and target's performance and the market value weighted average of the bidder and target industry performance. Pre-acquisition abnormal performance ($Performance_{pre,i}$) is the median value of the abnormal performance in the pre-merger period (years -3 to -1). The post-acquisition abnormal performance ($Performance_{post,i}$) is calculated in the same way, but for the acquiring firm only, and is the median of the post-acquisition years (+1 to +5). We then run the following cross-section OLS regressions to estimate abnormal changes in performance due to the takeover:

$$Performance_{post,i} = \alpha + \beta Performance_{pre,i} + \varepsilon_i \qquad (9)$$

The coefficient of the pre-acquisition performance variable ($Performance_{pre,i}$) measures the relationship between performance in the pre- and post-acquisition periods. The constant (α) of the above regression captures the average change in the industry-adjusted abnormal performance due to the takeover effect. The values of the constant (α) for the different subgroups are reported in Table 11.

We apply the difference-in-differences methodology in order to capture the net effect for overvalued stock acquirers. Cash acquirers are matched with stock acquirers through the Mahalanobis matching technique based on all control variables as described in

Section 5. Panels A, B and C present results for one-to-one, one-to-five and one-to-ten matches, respectively. We present results for Operating ROA, operating profit and asset turnover. The results in Panel A for the operating ROA (EBITDA/Assets) measure is negative for all four subgroups, indicating that all types of acquirers fail to create synergies through takeovers. High RM stock acquirers underperform as compared to low RM ones, indicating that they fail to create superior synergies for their shareholders. For the different performance measures and matching approaches, the difference between high and low RM cash acquirers is either positive, close to zero or negative, and if negative, it is less negative as compared with the difference coming from the stock subsamples. The overall net effects (dif-in-difs estimator) for high RM deals is negative, suggesting that overvalued acquirers do not choose target firms which can generate superior synergy gains. These findings lead us to two conclusions. First, the positive dif-in-difs estimator for buy-and-hold abnormal returns is unlikely to be influenced by the acquisition quality, giving further support to our hypothesis. Second, if overvaluation is the motive for such acquisitions, it is not surprising to observe that high RM stock acquirers fail to obtain synergistic gains.

[Insert Table 11 about here]

9. Alternative Measure of Misvaluation

The Rhodes-Kropf et al.'s (2005) decomposing methodology has been widely used in the corporate finance literature to identify misevaluation. Despite its popularity, for robustness reasons, we employ an additional method to capture merging firms misevaluation at firm level. Motivated by the asset pricing literature, we employ Fama-French five factor model (2015). Fama and French (2015) introduce to two additional

factors, profitability and investment, to the traditional three factor model and claim that the new model can explain variation in returns.

The rational of employing the five factor Fama-French model is the following: the variation in returns that cannot be explained by the five factors suggested by Fama and French will be captured in the constant. The five-factor model will generate Jensen's alpha while controlling for the covariance of returns with the five factors. (Nguyen and Swanson, 2009). The constant would capture excess returns when deviating from the benchmark. The model takes the form below:

$$R_{i,t} - R_{F,t} = \alpha_i + b_i\left(R_{M,t} - R_{F,t}\right) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_{t+} e_{i,t} \qquad (10)$$

Where R_i is bidders' and targets' monthly returns respectively for a period of 36 months prior to the acquisition announcement, R_F is the risk-free rate of return, $\left(R_{M,t} - R_{F,t}\right)$ is the market premium, SMB_t is the Small-minus-Big factor, HML_t is the High-minus-Low factor, RMW_t is robust-minus-weak profitability factor and CMA_t is the low-minus-high investment factor. All factors have been obtained from Kenneth French's website. A negative (positive) alpha would indicate that a particular bidder or target firm exhibits negative (positive) abnormal returns and can therefore be classified as overvalued (undervalued).

To construct the relative misevaluation ratio, we follow the same approach that is adopted in earlier sections of the paper and calculate the difference as follows:

$$\text{Relative Misvaluation} = \alpha_{bidder} - \alpha_{target} \qquad (11)$$

Negative values of the relative misevaluation indicate that the bidder is more overvalued or less undervalued than the target firm.

We re-run the entire analysis and based on the various robustness tests, the results hold. Table 12 shows the results of the difference-in-differences estimator. For brevity, in Table 12, in all models, the dependant variable is Buy-and-Hold abnormal returns for the 36 months window. Similar results (unreported and available upon request) are observed for other windows such as 24 and 60 months. In all models, we control for year and industry fixed effects. Standard errors are clustered by industry and year. In model 1, Buy-and-Hold abnormal returns (BHARs26) are regressed on a stock dummy, on a High dummy, the interaction of the two and a number of control variables. High is a dummy variable that takes the value of one if the relative misvaluation (RM) measure of the deal as described in formula (11) is negative and zero otherwise. The variable of interest is the interactive term Stock*High, which is positive and significant at the 1% significance level, indicating that the effect for stock acquirers that take advantage of higher relative misvaluations is positive. In models 2 and 3, cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on the Relative Misvaluation (RM) measure (model 2) and also based on the Relative Misvaluation (RM) measure and Bidder Misvaluation (model 3) respectively. In models 4, 5 and 6, cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on all variables as described in the Appendix. One stock acquirer is matched with one, five or ten cash acquirers in models 4, 5 and 6 respectively. The variable of interest which is the interactive terms remains positive and statistically significant confirming our main hypothesis. In model 7, High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal is lower than the median of the negative values of the RM measure. In model 8, High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the

deal belongs in the bottom quartile of the negative values of the RM measure. The aim in models 7 and 8 is to intensify the relative misevaluation measure in a similar manner as in table 7. The interactive variable is model 8 becomes even more positive and significant indicating that the more overvalued the bidder is as compared to the target, the higher the misevaluation benefits as described by Shleifer and Vishny (2003). Finally, in model 9, cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on target premiums (TargetCARs(-42,CD)) and all variables as described in the Appendix, Panel C. In model (10), the matching takes place on an alternative meaure of target premiums (TargetCARs(-1,+1)) and all variables as described in the Appendix, Panel C. Again the interactive variable of interest is positive and statistically significant.

In unreported results, as with the Rhodes-Kropf et al. (2005) decomposition model, we further examine whether overvalued stock acquirers pay lower premiums and whether that could drive the positive dif-in-difs estimator. We do not find any evidence in favour of this argument. We also control whether overvalued stock acquirers choose better quality deals. We provide evidence that synergistic gains do not impact on the positive dif-in-difs estimator. In large, the results hold and support the misevaluation hypothesis when we employ an alternative approach to capturing misevaluation.

[Insert Table 12 about here]

10. Calendar-Time Approach

To address the issue of event clustering, this section uses a calendar time approach to estimate bidders' long-run abnormal returns for the various portfolios. Monthly returns are estimated for various windows. For brevity, in this section we report results for the 36

months window following the acquisition announcement. In unreported results, the findings are robust for alternative long-run windows.

Monthly return time series are calculated by using a calendar-time (not event-time) approach (Mitchell and Pulvino, 2001). It is the value weighted return across all merger deals in each portfolio at a given month. The portfolios are rebalanced each month to include firms that performed a takeover during the previous month while also to remove firms that have reached the end of the 36-month period.

The average monthly excess returns for the three-year post acquisition period is the intercept (a) from the time-series regression of the calendar portfolio by estimating the following three models: the CAPM, the Fama and French three-factor model (1993) and the Carhart (1997) four-factor model as follows:

$$R_{p,t} - R_f = \alpha_p + \beta_{Mkt,p}\left(R_{m,t} - R_f\right) + \varepsilon_i \quad (12)$$

$$R_{p,t} - R_f = \alpha_p + \beta_{Mkt,p}\left(R_{m,t} - R_f\right) + \beta_{SMB,p}SMB_t + \beta_{HML,p}HML_t + \varepsilon_i \quad (13)$$

$$R_{p,t} - R_f = \alpha_p + \beta_{Mkt,p}\left(R_{m,t} - R_f\right) + \beta_{SMB,p}SMB_t + \beta_{HML,p}HML_t + \beta_{UMD,p}UMD_t + \varepsilon_i \quad (14)$$

Where $R_{p,t}$ is the value weighted monthly return of the calendar portfolio at month t, R_f is the monthly risk-free rate of return, $R_{m,t}$ is the monthly return on the market index at month t, SMB_t is the monthly return on small minus large firms at month t, HML_t is the monthly return on high book-to-market minus low book-to-market firms at month t and UMB_t is the monthly return on previous 12-month return winners minus previous 12-month loser firms

at month t. $\beta_{Mkt,p}$, $\beta_{SMB,p}$, $\beta_{HML,p}$, $\beta_{UMD,p}$ are the regression parameters for each portfolio and ε_i is the error term.

Table 13 depicts the results for the entire period of 33 years (396 months). Panel A presents results from estimating the CAPM for the various portfolios as earlier in the paper. For the overvalued stock portfolio, the constant alpha is negative 12 basis points while the alpha for the undervalued stock is even more negative (48 basis points). The long-short strategy of the two portfolios generates a positive alpha of 35 basis points. Similarly, a long-short strategy on overvalued cash versus undervalued cash acquirers generates a negative alpha of 11 basis points. The difference-in-differences of the two strategies generates a positive alpha of 46 basis points which is marginally insignificant at 15% significance level.

Panel B presents results when the Fama-French 3 factor model is employed. Alphas for the various portfolios are presented by most importantly, the difference-in-differences estimator is positive (57 basis points) and statistically significant at the 10% significance level. Similarly, in Panel C, we employ the Carhart four factor model. The difference-in-differences estimator remains positive (58 basis points) and statistically significant at the 10% significance level. Panel D presents the raw returns of each portfolio. The dif-in-difs estimator is slightly positive but insignificant. Raw returns are not risk adjusted and not the most appropriate measure for our setting.

Overall, the calendar-time approach also shows that the net outcome for acquirers that are overvalued and exploit their stock as a means of financing their deals is positive offering extra support to the analysis adopted in this paper.

[Insert Table 13 about here]

11. Conclusion

The market timing hypothesis of mergers and acquisitions claims that the long-term shareholders of acquirers could benefit if they purchase less overvalued or more undervalued target firms and convert their overvalued equity into less overvalued or more undervalued hard assets. Despite the theoretical predictions of this hypothesis, there is an ongoing debate in the empirical finance literature of whether this holds or not. On the one hand, Savor and Lu (2009) support this argument; while on the other hand, Fu et al. (2013) and Akbulut (2013) offer evidence against it. We contribute to the debate by isolating, capturing and measuring the effect emanating from the exploitation of overvaluation by employing equity in financing acquisition activity. Overvalued stock acquirers are subject to four opposing forces. First, due to their overvaluation, they are subject to a natural long-run price correction and a natural share price decline. Second, the announcement of stock acquisitions signals negative news to the market with respect to the firm's valuation. Third, there is an effect coming from the quality of the acquisition. Finally, they are subject to the effect of the exploitation of overvalued equity. To draw fruitful conclusions about the theoretical prediction of Shleifer and Vishny's (2003) hypothesis, we eliminate the first three forces and isolate the fourth. To do so, we employ a difference-in-differences approach. The first difference estimates the long-run performance of stock acquirers that exploit relative misvaluation versus stock acquirers that do not take advantage of their overvalued equity. This difference captures both effects related to the exploitation of overvalued equity and non-valuation related effects. The second difference estimates the difference between cash acquirers that are more overvalued than their targets and cash acquirers that are less overvalued than their targets; in other words, cash acquirers that could have exploited their

relative misvaluation but did not. This difference captures only non-valuation related effects, as the relative misvaluation of cash acquirers is not associated with any misvaluation benefits. The difference between these two differences alleviates the non-valuation related effects and isolates the valuation related effects. Our findings indicate that the difference-in-differences (dif-in-difs) estimator indicates a positive effect of around 15%-28% for a period two to five years post acquisition announcement for firms that exploited overvaluation by undertaking stock acquisitions versus those that did not. We further control whether overvalued stock acquirers perform better quality acquisition or underpayment drives the positive dif-in-difs estimator, but we find no evidence in favor of that.

The overall long-run performance of stock acquirers may be negative on average. The one thing that definitely should not be blamed for contributing towards driving acquirers' share prices down is the predictions of Shleifer and Vishny's model. The exploitation of relative misvaluations for stock acquirers serves as resistance to the deflationary effect of overvalued equity. The underperformance of stock acquirers can mainly be attributed to the signaling effect of the announcement of the equity offering. Despite the positive effect coming from the transformation of overvalued equity into less overvalued or undervalued hard assets, the performance of overvalued stock acquirers is not statistically different from that of overvalued cash acquirers. This indicates that the negative signaling effect is offset by the positive results of the exploitation of overvaluation. Our results also indicate that the informational content coming from various corporate events is an important factor for capital markets.

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Appendix

Variable	Definition
Panel A: Control Variable for Buy-and Hold Abnormal Returns (BHARs) - Tables 4, 5, 6, 7, 10	
Stock	Dummy variable which takes the value of 1 if the deal is 100% financed by equity and 0 otherwise
High	Dummy variable that takes the value of 1 if the relative misvaluation (RM) of the deal is higher than the first quartile of the positive values of the RM measure and 0 otherwise
Stock*High	Interactive variable: the stock dummy variable times the High dummy variable
Cash/TA	Acquirer's Cash scaled by acquirer's total assets as measured at the end of the fiscal year prior to the announcement of the deal, Datastream Code: Cash: WC02005, Total Assets: WC02999
Return on Equity	Acquirer's return on equity as measured at the end of fiscal year prior to the announcement of the deal, Datastream Code: WC08301
Sales Growth	The proportional change in sales calculated as the logarithm of net sales at the end of year t over the net sales at the end of year (t-1). Year t is the end of fiscal year prior to the announcement of the deal, Datastream Code of Net Sales: WC01001
Debt/Equity(-1)-Bid	Acquirer's total term debt scaled by its market value of equity as measured at the end of fiscal year prior to the announcement of the deal, Datastream code: WC08231
PE(-42days)-Bid	Acquirer's share price divided by its earnings per share as measured 42 days prior to the announcement of the deal
Log(TA)	The logarithm of acquirer's total assets as measured at the end of fiscal year prior to the announcement of the deal, Datastream Code: WC02999
BHARs(-12,-1)	Acquirer Buy-and-Hold abnormal returns for the period 12 months prior to 1 month prior to the announcement of the deal. The estimation of BHARs is described in Section 4 of the paper.
St.Dev.(-253,-42)-Bid	Acquirer's standard deviation of daily return for the period 253 to 42 days prior to the announcement of the deal
Relative Size	Value of the deal from Thomson Financial SDC divided by acquirer's market value of equity as measured 20 days prior to the announcement of the deal
MTBV(-42 days)-Bid	Acquirer's market value of equity divided by its book value of equity as measured 42 days prior to the announcement of the deal
Hostile	Dummy variable that takes the value of 1 if the deal is classified as "hostile" by Thomson Financial SDC and zero otherwise

Tender Offer	Dummy variable that takes the value of 1 if the deal is flagged as "Tender Offer" by Thomson Financial SDC and zero otherwise
TarTerm	Dummy variable that takes the value of 1 if there is a flag for target termination fee from Thomson Financial SDC and zero otherwise
BidLock	Dummy variable that takes the value of 1 if bidder lockup provisions are included as flagged from Thomson Financial SDC and zero otherwise
NoDealsinYear	The number of acquisitions announced by the same bidder in a given year
Panel B: Control Variable for Target Premium - Table 9	
Ln(MV) (-42 days)-Bid	The natural logarithm of acquirer's market value of equity as measured 42 days prior to the announcement of the acquisition
Ln(MV) (-42 days)-Tar	The natural logarithm of target's market value of equity as measured 42 days prior to the announcement of the acquisition
MTBV(-42 days)-Bid	Acquirer's market value of equity divided by its book value of equity as measured 42 days prior to the announcement of the deal
MTBV(-42 days)-Tar	Target's market value of equity divided by its book value of equity as measured 42 days prior to the announcement of the deal
Debt/Equity(-1)-Bid	Acquirer's total term debt scaled by its market value of equity as measured at the end of fiscal year prior to the announcement of the deal, Datastream code: WC08231
Debt/Equity(-1)-Tar	Target's total term debt scaled by its market value of equity as measured at the end of fiscal year prior to the announcement of the deal, Datastream code: WC08231
Operating ROA-Bid	Acquirer's operating income (WC01250) scaled by its market value of equity as measured at the end of fiscal year prior to the announcement of the deal
Operating ROA-Tar	Target's operating income (WC01250) scaled by its market value of equity as measured at the end of fiscal year prior to the announcement of the deal
BHARs(-12,-1)	Acquirer Buy-and-Hold abnormal returns for the period 12 months prior to 1 month prior to the announcement of the deal. The estimation of BHARs is described in Section 4 of the paper.
St.Dev.(-253,-42)-Bid	Acquirer's standard deviation of daily return for the period 253 to 42 days prior to the announcement of the deal
Hostile	Dummy variable that takes the value of 1 if the deal is classified as "hostile" by Thomson Financial SDC and zero otherwise
Tender Offer	Dummy variable that takes the value of 1 if the deal is flagged as "Tender Offer" by Thomson Financial SDC and zero otherwise
TarTerm	Dummy variable that takes the value of 1 if there is a flag for target termination fee from Thomson Financial SDC and zero otherwise
BidLock	Dummy variable that takes the value of 1 if bidder lockup provisions are included as flagged from Thomson Financial SDC and zero otherwise

NoDealsinYear	The number of acquisitions announced by the same bidder in a given year
Panel C: Variable used in the matching Mahalanobis technique	
cash to total assets	Acquirer's Cash scaled by acquirer's total assets as measured at the end of the fiscal year prior to the announcement of the deal, Datastream Code: Cash: WC02005, Total Assets: WC02999
Return on equity	Acquirer's return on equity as measured at the end of fiscal year prior to the announcement of the deal, Datastream Code: WC08301
Sales growth	The proportional change in sales calculated as the logarithm of net sales at the end of year t over the net sales at the end of year (t-1). Year t is the end of fiscal year prior to the announcement of the deal, Datastream Code of Net Sales: WC01001
Debt –to-equity ratio	Acquirer's total term debt scaled by its market value of equity as measured at the end of fiscal year prior to the announcement of the deal, Datastream code: WC08231
Price-to-earnings ratio	Acquirer's share price divided by its earnings per share as measured 42 days prior to the announcement of the deal
Total assets	The logarithm of acquirer's total assets as measured at the end of fiscal year prior to the announcement of the deal, Datastream Code: WC02999
Bidder performance	Acquirer Buy-and-Hold abnormal returns for the period 12 months prior to 1 month prior to the announcement of the deal. The estimation of BHARs is described in Section 4 of the paper.
The standard deviation of bidder daily returns	Acquirer's standard deviation of daily return for the period 253 to 42 days prior to the announcement of the deal
The relative size of deal	Value of the deal from Thomson Financial SDC divided by acquirer's market value of equity as measured 20 days prior to the announcement of the deal
The market-to-book value ratio	Acquirer's market value of equity divided by its book value of equity as measured 42 days prior to the announcement of the deal
Level of debt	Acquirer's level of total debt

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Figure 1. The Difference-in-Differences Framework

This figure is a graphical representation of the difference-in-differences estimator for acquirers that take advantage of relative misvaluations (High RM) versus those that do not (Low RM). The control group is a cash acquisitions subsample selected using a Mahalanobis matching methodology. The difference between high and low in the cash group captures any non-valuation related effects. Distance A_1 depicts that effect. The treatment group is the stock acquisitions subsample. The difference between high and low for stock acquisitions (distance A_3) captures both valuation and non-valuation related effects. If the impact of non-valuation related effects is captured by the cash subsample (distance A_1), the relative misvaluation benefit for stock acquirers is the difference of A_3 minus A_1 (distance A_2).

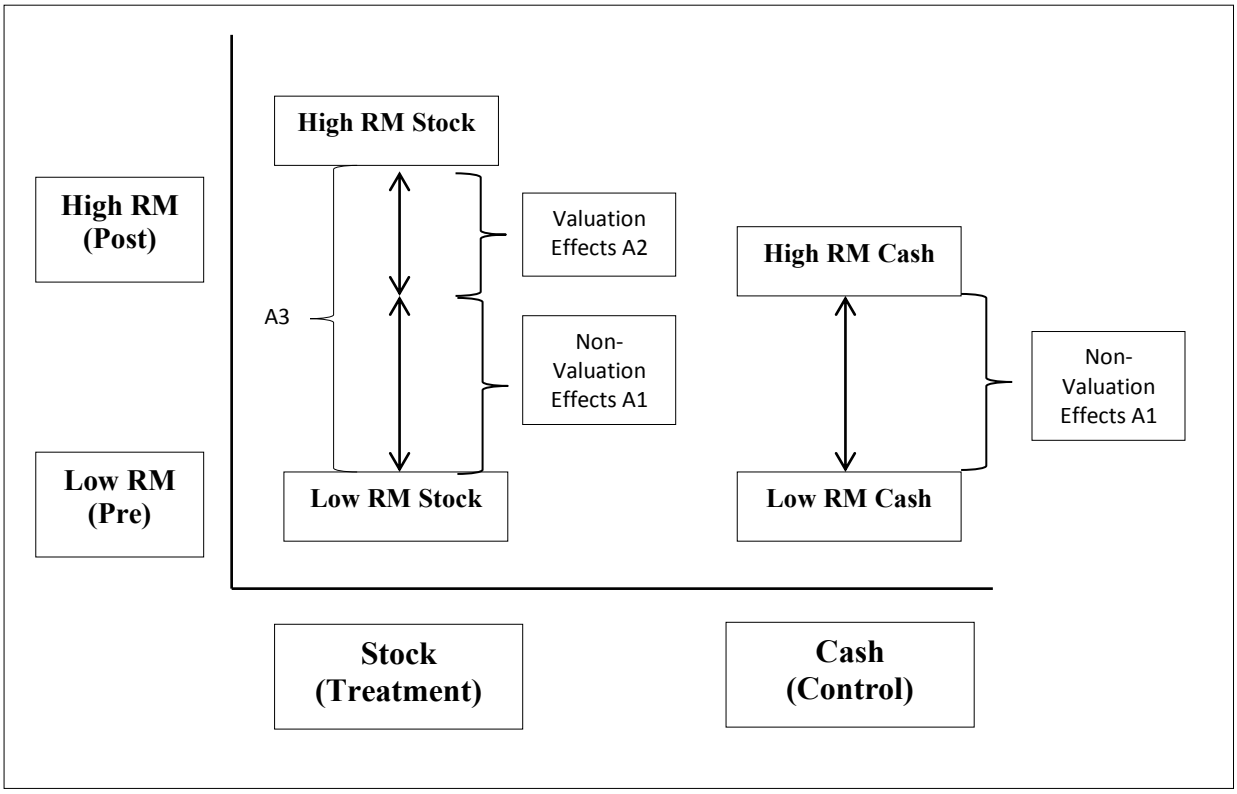

Table 1. Time Series Distribution of Takeovers

This table shows the time series distribution of takeovers by year for the overall sample for stock and for cash acquirers. The summary statistics are provided for 1,954 acquisitions from 1985 to 2016. A deal is classified as stock (cash) if it is 100% financed with equity (cash).

	All	Stock	Cash
1985	21	7	14
1986	27	7	20
1987	14	8	6
1988	38	17	21
1989	37	20	17
1990	25	17	8
1991	36	31	5
1992	39	31	8
1993	47	36	11
1994	98	72	26
1995	123	98	25
1996	125	100	25
1997	182	146	36
1998	192	157	35
1999	182	144	38
2000	157	119	38
2001	114	80	34
2002	60	32	28
2003	72	37	35
2004	84	41	43
2005	70	35	35
2006	77	26	51
2007	76	18	58
2008	42	16	26
2009	34	20	14
2010	56	21	35
2011	33	12	21
2012	49	17	32
2013	51	18	33
2014	52	22	30
2015	70	28	42
2016	69	23	46
Total	**2352**	**1456**	**896**

Table 2. Descriptive Statistics on the Misvaluation Measure

This table presents the median values for the different components of the decomposition methodology as proposed by Rhodes-Kropf et al. (2005). Misvaluation is measured either 42 days prior to the acquisition or one day before the announcement date. Rhodes-Kropf et al. (2005) decompose the market-to-book value ratio into two components: the misvaluation component and the long-run investment opportunities component:

$$Ln\left(\frac{M}{B}\right) = Ln\left(\frac{M}{V}\right) + Ln\left(\frac{V}{B}\right)$$

	Bidder	Target	Bidder-Stock	Bidder-Cash	Target-Stock	Target-Cash
$Ln\left(\frac{M}{V}\right)(-42days)$	0.590	-0.013	0.704	0.462	0.112	-0.180
$Ln\left(\frac{M}{V}\right)(-1day)$	0.649	0.066	0.764	0.483	0.227	-0.121
$Ln\left(\frac{M}{B}\right)(-42days)$	0.852	0.612	0.919	0.767	0.622	0.606
$Ln\left(\frac{M}{B}\right)(-1day)$	0.900	0.700	0.980	0.784	0.716	0.691
$Ln\left(\frac{V}{B}\right)(-42days)$	0.287	0.644	0.255	0.330	0.542	0.752

Table 3. The Difference-in-Differences Univariate Approach for Buy-and-Hold Abnormal Returns (BHARs)

This table presents the Buy-and-Hold Abnormal Returns (BHARs) for the holding periods of 12, 24, 36 and 60 months after the announcement of the acquisition. BHARs are calculated as:

$$BHARs_i(0,T) = \prod_{t=0}^{T}(1+R_{i,t}) - \prod_{t=0}^{T}(1+R_{m,t})$$

Where $BHARs_i(0,T)$ is the buy-and-hold abnormal returns for acquirer i from time t=0, which is the month of the acquisition announcement to month T, T is the holding period, $R_{i,t}$ is the monthly return for acquirer i in month t and $R_{m,t}$ is the Datastream value-weighted market index for the US market. Stock denotes 100% equity-financed acquisitions and cash denotes 100% cash-financed acquisitions. Acquisitions are classified as High (Low) RM if the Relative misvaluation measure (RM) is higher (lower) than the first quartile of the positive values of RM. The Relative Misvaluation measure is estimated as: $RM_i = Ln\left(\frac{M}{V}\right)_{Bidder} - Ln\left(\frac{M}{V}\right)_{Target}$ Where RM is the relative misvaluation of a takeover, $Ln\left(\frac{M}{V}\right)_{Bidder}$ is bidder's misvaluation and $Ln\left(\frac{M}{V}\right)_{Target}$ is target's misvaluation 42 days before the acquisition announcement. The $Ln\left(\frac{M}{V}\right)_{Bidder}$ and $Ln\left(\frac{M}{V}\right)_{Target}$ are components of the decomposition of the market-to-book ratio of the bidder and target. The Dif (High-Low RM) denotes the difference in performance between high and low RM portfolios, the Dif(Stock-Cash) denotes the difference in performance between stock and cash portfolios and the Dif-in-Difs denotes the difference-in-differences between stock and cash acquisitions. All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

	BHARs12			BHARs24		
	Stock	Cash	Dif(Stock-	Stock	Cash	Dif(Stock-
High RM	-5.18%**	1.96%	-7.14%**	-	-0.20%	-10.94%**
Low RM	-9.50%***	3.19%	-12.69%***	-	9.35%***	-25.47%***
			Dif-in-Difs			Dif-in-Difs
Dif (High-Low	4.32%	-1.23%	**5.55%**	4.99%	-9.55%**	**14.54%***
	BHARs36			BHARs60		
	Stock	Cash	Dif(Stock-	Stock	Cash	Dif(Stock-
High RM	-9.97%**	1.76%	-11.73%*	-10.61%	-1.14%	-9.46%
Low RM	-	12.78%**	-33.15%***	-	16.96%**	-37.92%***
			Dif-in-Difs			Dif-in-Difs
Dif (High-Low	10.40%*	-11.02%*	**21.42%****	10.36%	-	**28.46%****

Table 4. The Difference-in-Differences Multivariate Approach for Buy-and-Hold Abnormal Returns (BHARs)

This table presents the Buy-and-Hold Abnormal Returns (BHARs) for the holding periods of 12, 24, 36 and 60 months after the announcement of the acquisition. BHARs is the dependent variable. Stock is a dummy variable that takes the value of one if the deal is 100% financed with equity. High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal is higher than the first quartile of the positive values of the RM measure. Stock*High is the interactive term between the Stock and High dummy variables. The rest of the control variables are described in the Appendix, Panel A. BHARs and RM are estimated as discussed in the description of Table 3. All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. In regressions (2), (4), (6) and (8), we control for year and industry fixed effects. Standard errors are clustered by industry and year. N denotes the number of observations.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	BHARs12	BHARs12	BHARs24	BHARs24	BHARs36	BHARs36	BHARs60	BHARs60
Stock	-0.090**	-0.078*	-	-	-	-	-	-0.430***
High	-0.007	-0.005	-0.102*	-0.100**	-0.157**	-0.157**	-0.213**	-0.228***
Stock*High	**0.095***	**0.081***	**0.211****	**0.178****	**0.317****	**0.253****	**0.421****	**0.366*****
Cash/TA	0.099	0.130	0.101	0.115	0.468	0.521	0.338	0.611
Return on Equity	-0.000	-0.001	0.000	0.000	0.001	0.001	0.001	0.001
Sales Growth	-	-	-0.378**	-0.263*	-0.383**	-0.259	-0.229	-0.172
Debt/Equity(-1)-	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000
PE(-42days)-Bid	-0.000	-0.000	-0.000	-0.000	0.000	0.000	-0.000	-0.000
Log(TA)	0.015	-0.004	0.045*	-0.025	0.058	-0.048	-0.043	-0.120**
BHARs(-12,-1)	-0.005	-0.016	-	-	-	-	-	-0.110***
St.Dev.(-253,-42)-	-0.619	-	1.755	-	2.165	-	-0.456	-
Relative Size	0.042	0.051	0.052	0.057	0.100	0.123*	0.072	0.100
MTBV(-42 days)-	-0.007	-0.007	-0.010	-0.009	-0.003	-0.002	-0.015	-0.017
Hostile	0.099	0.056	0.002	0.078	-0.071	0.067	-0.588*	-0.403*
Tender Offer	0.027	0.013	-0.077	-0.076*	-0.135**	-0.094*	-	-0.220***
TarTerm	-0.000	0.026	-0.043	-0.006	-0.060	-0.038	0.043	0.001
BidLock	-0.054	-0.023	-0.088	-0.001	0.022	0.015	0.123	0.079
NoDealsinYear	-0.017	-0.018	-0.013	0.002	-0.063	-0.070*	0.033	-0.061*
Constant	-0.025	0.208	-0.146	0.203	-0.187	0.623*	0.487	1.093**
Industry FE	No	Yes	No	Yes	No	Yes	No	Yes
Year FE	No	Yes	No	Yes	No	Yes	No	Yes
N	1671	1671	1615	1615	1557	1557	1469	1469
adj. R-sq	0.021	0.060	0.029	0.113	0.022	0.101	0.013	0.099

Table 5. Cash Acquirers Matched with Stock Acquirers on the Basis of Relative Misvaluation and Bidder Misvaluation. The Difference-in-Differences Multivariate Approach for Buy-and-Hold Abnormal Returns (BHARs)

This table presents the Buy-and-Hold Abnormal Returns (BHARs) for the holding periods of 12, 24, 36 and 60 months following the announcement of the acquisition. BHARs is the dependent variable. Stock is a dummy variable that takes the value of one if the deal is 100% financed with equity. High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal is higher than the first quartile of the positive values of the RM measure. Stock*High is the interactive term between the Stock and High dummy variables. The rest of the control variables are described in the Appendix, Panel A. Cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on the Relative Misvaluation (RM) measure (Panel A) and also based on the Relative Misvaluation (RM) measure and Bidder Misvaluation (Panel B). BHARs and RM are estimated as discussed in the description of Table 3. All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. In all regressions, we control for year and industry fixed effects. Standard errors are clustered by industry and year. N denotes the number of observations.

	Panlel A: Mahalanobis 1 to 1: Matched on				Panel B: Mahalanobis 1 to 1: Matched on Relative			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	BHARs1	BHARs2	BHARs3	BHARs6	BHARs12	BHARs24	BHARs36	BHARs60
Stock	-0.094*	-	-	-	0.003	-0.090	-0.173**	-0.355***
High	-0.052	-	-	-	0.073*	-0.033	-0.099	-0.120
Stock*High	0.138*	0.238*	0.340*	0.495*	0.009	0.116*	0.194**	0.259**
Cash/TA	0.076	-0.049	0.334	0.254	0.192*	0.098	0.509*	0.234
Return on	-0.000	0.000	0.001	0.002	-0.000	0.000	0.001	0.002
Sales Growth	-	-0.237*	-0.233	-0.067	-0.351***	-0.391**	-0.420**	-0.265
Debt/Equity(	-0.000	0.000	0.000	0.000	-0.000	-0.000	-0.000	0.000
PE(-42days)-	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.000	-0.000
Log(TA)	-0.003	-0.035	-0.063	-	-0.000	0.002	-0.033	-0.179**
BHARs(-12,-	-0.014	-	-	-	-0.013	-0.053***	-0.097***	-0.068
St.Dev.(-	-	-	-	-	-5.222***	-6.547***	-10.334***	-14.496***
Relative Size	0.088	0.037	0.097	0.079	0.041	0.060	0.110	0.061
MTBV(-42	-0.005	-0.006	0.000	-0.010	-0.009**	-0.010	-0.003	-0.016
Hostile	-	-	-	-	-0.137	-0.357*	-0.305*	-0.078
Tender Offer	0.043	-0.079	-0.094	-0.178	0.028	-0.047	-0.110	-0.307***
TarTerm	0.004	-0.059	-0.093	-0.092	-0.006	-0.052	-0.098	-0.049
BidLock	-0.061	-0.017	-0.002	0.107	-0.037	-0.028	-0.005	0.109
NoDealsinYe	-0.022	-0.018	-	-	-0.035	-0.023	-0.109**	-0.064
Constant	0.191	0.196	0.552	1.248*	0.235	-0.014	0.588	1.444***
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1995	1929	1863	1743	2005	1939	1870	1755
adj. R-sq	0.083	0.150	0.132	0.113	0.095	0.159	0.147	0.105

Table 6. Cash Acquirers Matched with Stock Acquirers on the Basis of All Variables. The Difference-in-Differences Multivariate Approach for Buy-and-Hold Abnormal Returns (BHARs)

This table presents the Buy-and-Hold Abnormal Returns (BHARs) for the holding periods of 12, 24, 36 and 60 months following the announcement of the acquisition. BHARs is the dependent variable. Stock is a dummy variable that takes the value of one if the deal is 100% financed with equity. High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal is higher than the first quartile of the positive values of the RM measure. Stock*High is the interactive term between the Stock and High dummy variables. The rest of the control variables are described in the Appendix, Panel A. Cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on all variables as described in the Appendix, Panel C. In Panels A, B and C, one stock acquirer is matched with one, five or ten cash acquirers, respectively. BHARs and RM are estimated as discussed in the description of Table 3. All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. In all regressions, we control for year and industry fixed effects. Standard errors are clustered by industry and year. N denotes the number of observations.

	Panel A: Mahalanobis 1 to 1				Panel B: Mahalanobis 1 to 5				Panel C: Mahalanobis 1 to 10			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	BHAR s12	BHAR s24	BHARs 36	BHARs 60	BHAR s12	BHAR s24	BHARs 36	BHARs 60	BHAR s12	BHAR s24	BHARs 36	BHARs 60
Stock	-	-	-	-	-	-	-	-	-	-	-	-
High	0.075	0.009	-0.061	-0.077	0.049	-	-0.070	-0.056	0.048	-	-0.066	-0.071
Stock*High	-	0.093	0.177	0.232	0.034	0.135	0.173	0.218	0.028	0.127	0.154	0.217
Cash/TA	0.078	0.079	0.458	0.582	-	-	0.163	0.093	-	-	0.115	0.049
Return on	-	0.000	0.001	0.001	0.000	0.000	0.001	0.002	0.001	0.000	0.001	0.002
Sales	-	-	-0.225	-0.106	-	-	0.101	0.172	-	0.069	0.249	0.325
Debt/Equity	-	-	0.000	0.000	-	-	-0.000	0.000	-	-	-0.000	0.000
PE(-	-	-	0.000	-0.000	-	-	0.000	-0.000	-	0.000	0.000	0.000
Log(TA)	-	-	-	-	-	-	-0.046	-	-	-	-0.024	-
BHARs(-12,-	-	-	-	-0.071	-	-	-	-0.049	-	-	-	-0.047
St.Dev.(-	-	-	-	-	-	-	-	-	-	-	-	-

Relative	0.024	0.075	0.130	0.092	0.075	0.061	0.074	0.042	0.069	0.050	0.057	0.031
MTBV(-42	-	-	-0.002	-0.019	-	-	-0.004	-0.021	-	-	-0.006	-0.025
Hostile	0.144	-	0.034	-0.439	0.020	-	-0.302	-0.466	-	-	-	-0.395
Tender	-	-	-0.080	-0.116	-	-	-0.092	-	-	-	-0.095	-
TarTerm	0.038	0.017	-0.033	-0.066	-	-	-0.103	-0.129	-	-	-	-0.134
BidLock	0.001	0.030	0.030	0.077	0.021	0.074	0.132	0.181	0.013	0.088	0.154	0.163
NoDealsinY	-	0.010	-0.061	-	-	-	-0.102	-0.070	-	-	-0.072	-0.037
Constant	0.552	0.623	0.988	1.272	0.490	0.713	1.043	1.967	0.444	0.562	0.852	1.868
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2002	1964	1901	1787	6011	5839	5622	5262	1102	1067	10248	9515
adj. R-sq	0.080	0.148	0.112	0.103	0.166	0.222	0.194	0.180	0.185	0.253	0.235	0.229

Table 7. Intensified Measure of Relative Misvaluation. The Difference-in-Differences Multivariate Approach for Buy-and-Hold Abnormal Returns (BHARs)

This table presents the Buy-and-Hold Abnormal Returns (BHARs) for the holding periods of 12, 24, 36 and 60 months following the announcement of the acquisition. BHARs is the dependent variable. Stock is a dummy variable that takes the value of one if the deal is 100% financed with equity. In Panel A, High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal is higher than the median of the positive values of the RM measure. In Panel B, High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal belongs in the top quartile of the positive values of the RM measure. Stock*High is the interactive term between the Stock and High dummy variables. The rest of the control variables are described in the Appendix, Panel A. Cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on all variables as described in the Appendix, Panel C. BHARs and RM are estimated as discussed in the description of Table 3. All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. In all regressions, we control for year and industry fixed effects. Standard errors are clustered by industry and year. N denotes the number of observations.

	Panel A: RM 50% or higher				Panel B: RM 75% or higher			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	BHARs12	BHARs24	BHARs36	BHARs60	BHARs12	BHARs24	BHARs36	BHARs60
Stock	-0.042	-0.132**	-0.220***	-0.301***	-0.038	-0.145***	-0.211***	-0.335***
High	0.031	-0.005	-0.116	-0.072	0.026	0.028	-0.132	0.046
Stock*High	0.063	0.137*	0.296**	0.289*	0.158	0.189*	0.370**	0.458*
Cash/TA	0.182	0.254	0.729**	0.813	0.332*	0.504**	0.875**	1.192
Return on Equity	-0.001	0.000	0.000	0.001	-0.001	-0.000	-0.001	0.000
Sales Growth	-0.250**	-0.146	-0.145	-0.054	-0.202	-0.038	0.081	0.214
Debt/Equity(-1)-	-0.000	-0.000	0.000	0.000	-0.000	-0.000	0.000	0.000
PE(-42days)-Bid	-0.000	0.000	0.000	-0.000	-0.000	0.000	0.000	-0.000
Log(TA)	-0.031	-0.055	-0.045	-0.129	-0.022	-0.048	-0.032	-0.168*
BHARs(-12,-1)	-0.009	-0.053**	-0.108***	-0.075	0.000	-0.036	-0.109**	-0.035
St.Dev.(-253,-42)-	-	-	-	-	-	-	-	-
Relative Size	0.013	0.093*	0.162**	0.123	-0.011	0.047	0.113	0.129
MTBV(-42 days)-	-0.010*	-0.008	-0.002	-0.020*	-0.013**	-0.018*	-0.020**	-0.036**
Hostile	0.205	0.097	0.169	-0.277	0.288	0.659	0.674	0.049
Tender Offer	-0.060	-0.052	-0.115	-0.192*	-0.033	-0.096	-0.154	-0.344**

TarTerm	0.001	-0.043	-0.066	-0.102	0.022	0.016	-0.014	0.042
BidLock	0.027	0.086	0.042	0.117	0.021	0.085	0.092	0.249*
NoDealsinYear	-0.041	-0.018	-0.105**	-0.078**	-0.014	-0.012	-0.115	-0.079
Constant	0.603***	0.596**	0.940**	1.211**	0.599***	0.849**	1.017**	1.728**
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1544	1511	1458	1366	1166	1138	1090	1023
adj. R-sq	0.077	0.188	0.116	0.107	0.093	0.201	0.166	0.110

Table 8. The Difference-in-Differences Univariate Approach for Target Premium

This table presents the target premium received by using two measures. We estimate target firms' cumulative abnormal returns around the acquisition announcement date as:

$$Target\ CARs(-t_1, +T) = \sum_{-t_1}^{T} (R_{i,t} - R_{m,t})$$

Where Target CARs(-t,+T) is target cumulative abnormal returns from t_1 days before the announcement of the deal up to T days after the announcement, Ri,t is the target firm's return on day t and Rm,t is the Datastream value-weighted market index for the US market. Target cumulative abnormal returns are estimated for the period 42 days prior to the acquisition date up to the completion day (CD) [Target CARs(-42,+CD)]. Results are presented in Panel A. We also estimate target cumulative abnormal returns for the period one day prior to the acquisition date up to one day after the announcement [Target CARs(-1,+1)]. Results are presented in Panel B. Stock denotes 100% equity-financed acquisitions, cash denotes 100% cash-financed acquisitions and All denotes both stock and cash acquisitions. Acquisitions are classified as High (Low) RM as described in Table 3. Cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on all variables as described in Appendix, Panel C.

The Dif (High-Low RM) denotes the difference in performance between high and low RM portfolios and the Dif-in-Difs denotes the difference-in-differences between stock and cash acquisitions. All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

	Panel A: Target CARs(-42,CD)				Panel B: Target CARs(-1,+1)			
	All	Stock	Cash		All	Stock	Cash	
High RM	41.94%*	37.85%*	46.03%*		27.13%*	20.09%*	34.16%*	
Low RM	23.42%*	21.92%*	24.91%*		16.87%*	14.42%*	19.31%*	
Dif (High-Low	18.52%*	15.93%*	21.12%*	**Dif-in--5.20%**	10.26%*	5.67%**	14.85%*	**Dif-in--**

Table 9. The Difference-in-Differences Multivariate Approach for Target Premiums

This table presents the target premiums regression analysis results. TargetCARs(-42,CD) and TargetCARs(-1,+1), as described in Table 8, are the dependent variables. Stock is a dummy variable that takes the value of one if the deal is 100% financed with equity. High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal is higher than the first quartile of the positive values of the RM measure. Stock*High is the interactive term between the Stock and High dummy variables. The rest of the control variables are described in Appendix, Panel B. Cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on all variables as described in the Appendix, Panel C. In Panels A, B and C, one stock acquirer is matched with one, five or ten cash acquirers, respectively. RM is estimated as discussed in the description of Table 3. All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. In all regressions, we control for year and industry fixed effects. Standard errors are clustered by industry and year. N denotes the number of observations.

	Panel A: Mahalanobis 1 to 1		Panel B: Mahalanobis 1 to 5		Panel C: Mahalanobis 1 to 10	
	(1)	(2)	(3)	(4)	(5)	(6)
	TargetCARs(-42,CD)	TargetCARs(-1,+1)	TargetCARs(-42,CD)	TargetCARs(-1,+1)	TargetCARs(-42,CD)	TargetCARs(-1,+1)
Stock	0.016	-0.021	0.031	0.011	0.050	0.034
High	0.029	0.033	0.042*	0.033	0.038	0.032
Stock*High	-0.038	-0.066*	-0.091**	-0.102***	-0.101**	-0.114***
Ln(MV) (-42	0.078***	0.053***	0.086***	0.065***	0.087***	0.069***
Ln(MV) (-42	-0.108***	-0.078***	-0.134***	-0.111***	-0.146***	-0.123***
MTBV(-42	0.001	0.000	0.001	0.000	-0.000	0.000
MTBV(-42	-0.012***	-0.006*	-0.011***	-0.006	-0.008*	-0.005
Debt/Equity(-	36.909	5.642	68.680	92.415	70.601	108.314
Debt/Equity(-	61.766	27.663	-49.352	-80.744	-81.855	-100.048
Operating	0.000	0.000	0.000	0.000	0.000	0.000
Operating	0.000	-0.000	-0.000	0.000	-0.000	0.000
BHARs(-12,-1)	0.065***	0.006	0.032	-0.024	0.015	-0.043
St.Dev.(-253,-	0.695	0.817	2.631	1.216	3.945*	1.832
Hostile	0.045	0.108**	0.028	-0.009	0.158	-0.077
Tender Offer	0.098***	0.051*	0.027	0.026	0.027	0.030
TarTerm	0.065**	0.059*	-0.019	0.006	-0.041	-0.007
BidLock	0.027	0.016	0.043	0.055	0.035	0.060
NoDealsinYear	-0.008	0.015	0.017	0.036	0.021	0.036
Constant	0.008	0.207	0.060	0.270*	0.104	0.300*
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1534	1534	4659	4659	8688	8688
adj. R-sq	0.225	0.204	0.274	0.190	0.287	0.199

Table 10. Cash Acquirers Matched with Stock Acquirers on the Basis of Premiums and All Other Variables. The Difference-in-Differences Multivariate Approach for Buy-and-Hold Abnormal Returns (BHARs)

This table presents the Buy-and-Hold Abnormal Returns (BHARs) for the holding periods of 12, 24, 36 and 60 months following the announcement of the acquisition. BHARs is the dependent variable. Stock is a dummy variable that takes the value of one if the deal is 100% financed with equity. High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal is higher than the first quartile of the positive values of the RM measure. Stock*High is the interactive term between the Stock and High dummy variables. The rest of the control variables are described in the Appendix, Panel A. Cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on TargetCARs(-42,CD) only (Panel A), matched on TargetCARs(-42,CD) and all variables as described in the Appendix, Panel C (Panel B), matched on TargetCARs(-1,+1) only (Panel C) and matched on TargetCARs(-1,+1) and all variables as described in the Appendix, Panel C (Panel D). TargetCARs(-42,CD) and TargetCARs(-1,+1) are estimated as discussed in the description of Table 8. BHARs and RM are estimated as discussed in the description of Table 3. All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. In all regressions, we control for year and industry fixed effects. Standard errors are clustered by industry and year. N denotes the number of observations.

	Panel A: Matched on TargetCARs(-42,CD)				Panel B: Matched on TargetCARs(-42,CD) +			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	BHARs1	BHARs2	BHARs3	BHARs60	BHARs12	BHARs24	BHARs36	BHARs60
Stock	-0.064	-0.105*	-0.162*	-0.255*	-0.028	-0.112**	-0.178**	-0.202*
High	-0.034	-0.084	-0.132	-0.185	0.090*	0.020	-0.066	-0.054
Stock*High	0.104**	0.156**	0.214**	0.294**	-0.009	0.082*	0.183**	0.203
Cash/TA	0.139	0.011	0.452	0.300	0.089	0.067	0.466	0.470
Return on Equity	-0.000	0.000	0.001	0.001	-0.000	0.001	0.001	0.001
Sales Growth	-	-	-0.260*	-0.196	-0.281***	-0.250	-0.216	-0.086
Debt/Equity(-1)-	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	0.000	0.000
PE(-42days)-Bid	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.000	-0.000
Log(TA)	0.018	0.017	0.011	-0.096	-0.032	-0.060*	-0.064*	-0.164**
BHARs(-12,-1)	-0.012	-	-	-0.099**	-0.015	-0.062***	-0.100***	-0.070
St.Dev.(-253,-	-	-	-	-	-4.569***	-7.470***	-	-
Relative Size	0.013	0.049	0.083	0.014	0.051	0.042	0.099	0.030
MTBV(-42 days)-	-0.005	-0.004	-0.000	-0.018*	-0.005	-0.007	-0.001	-0.018
Hostile	0.060	0.184	0.125	-0.162	-0.054	-0.260	-0.245	-0.312
Tender Offer	0.001	-0.062	-0.074	-0.162*	-0.052	-0.071	-0.074	-0.140
TarTerm	0.015	-0.024	-0.036	-0.013	0.004	-0.024	-0.103*	-0.115
BidLock	-0.038	0.022	0.080	0.173	0.007	0.049	0.051	0.128
NoDealsinYear	-	-0.048	-	-0.069**	-0.010	0.006	-0.074*	-0.049
Constant	-0.014	-0.506	-0.157	0.313	0.542***	0.610**	0.822***	1.274**
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2012	1950	1899	1772	2008	1961	1906	1795
adj. R-sq	0.064	0.121	0.118	0.100	0.080	0.138	0.106	0.098

	Panel C: Matched on TargetCARs(-1,+1)				Panel D: Matched on TargetCARs(-1,+1) + Other			
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	BHARs1	BHARs2	BHARs3	BHARs60	BHARs12	BHARs24	BHARs36	BHARs60
Stock	-0.009	-0.086	-	-	-0.052	-0.132**	-0.172**	-0.248**
High	0.032	-0.030	-0.089	-0.172	0.086*	0.026	-0.013	-0.042
Stock*High	0.047	0.108	0.197*	0.299**	-0.005	0.071	0.127*	0.197*
Cash/TA	0.019	-0.014	0.340	0.310	0.004	-0.057	0.379	0.435
Return on Equity	-0.001	0.001	0.001	0.003	-0.000	0.001	0.001	0.001
Sales Growth	-	-0.177	-0.112	-0.093	-0.273**	-0.235	-0.221	-0.106
Debt/Equity(-1)-	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	-0.000	0.000
PE(-42days)-Bid	-0.000	-0.000	0.000	-0.000**	-0.000	-0.000	0.000	-0.000
Log(TA)	-0.014	-0.005	-0.015	-0.073	-0.042*	-0.072**	-0.078*	-0.171***
BHARs(-12,-1)	-0.007	-	-	-0.087*	-0.017	-0.063***	-0.099***	-0.069
St.Dev.(-253,-	-	-	-	-9.387**	-4.259***	-7.103***	-	-
Relative Size	0.068	0.073	0.146**	0.076	0.042	0.045	0.089	0.038
MTBV(-42 days)-	-0.010*	-0.012	-0.004	-0.016	-0.005	-0.006	-0.002	-0.020
Hostile	0.573	0.979	1.014	-0.427	-0.075	-0.286	-0.301	-0.323
Tender Offer	0.062	-0.058	-0.144*	-	-0.038	-0.053	-0.097	-0.124
TarTerm	-0.007	-0.030	-0.015	-0.037	0.010	-0.000	-0.050	-0.059
BidLock	0.012	0.024	0.077	0.125	0.007	0.042	0.029	0.100
NoDealsinYear	-0.026	-0.005	-	-0.075	-0.016	0.000	-0.074	-0.050
Constant	0.015	-0.482	-0.066	0.259	0.557***	0.500*	0.950***	1.493***
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2017	1932	1874	1763	2005	1963	1903	1784
adj. R-sq	0.102	0.153	0.129	0.121	0.089	0.146	0.102	0.097

Table 11. The Difference-in-Differences Univariate Approach for Acquirers' Operating Performance

This table presents the operating performance of takeovers. The constant (α) of the following regression is reported for each portfolio:

$$Performance_{post,i} = \alpha + \beta Performance_{pre,i} + \varepsilon_i$$

$Performance_{pre,i}$ is the pre-acquisition abnormal performance, which is estimated as the median value of the abnormal performance in the pre-merger years (-3 to -1). $Performance_{post,i}$ is the post-acquisition abnormal performance, which is estimated as the median value of the abnormal performance in the post-acquisition years (+1 to +5). In the period prior to the acquisition, performance is calculated as the market value weighted average of the target's and acquiring firm's performance. We also calculate the industry median performance of the acquirer's and the target's industry, and a market value weighted average is estimated. Abnormal performance is estimated as the difference between the market value weighted average of the bidder and target performance and the market value weighted average of the bidder and target industry performance. The post-acquisition abnormal performance is calculated in the same way, but for the acquiring firm only. The main measure of operating performance is Earnings Before Interest Taxes and Depreciation (EBITDA) divided by total assets. The measure of Operating Return on Assets (ROA) is decomposed into Operating Profit Margin, calculated as EBITDA divided by sales, and asset turnover calculated as sales divided by assets.

$$Operating\ ROA = \frac{EBITDA}{Assets} = \frac{EBITDA}{Sales} x \frac{Sales}{Assets}$$

Stock denotes 100% equity-financed acquisitions and cash denotes 100% cash-financed acquisitions. Acquisitions are classified as High (Low) RM as described in Table 3. Cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on all variables as described in the Appendix, Panel C. The Dif (High-Low RM) denotes the difference in performance between high and low RM portfolios and the Dif-in-Difs denotes the difference between stock and cash acquisitions of their differences between high and low RM deals. All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

	EBITDA/Assets			EBITDA/Sales			Sales/Assets		
Panel A: Mahalanobis 1 to 1									
High RM	-	-		-	-		-	-	
Low RM	-	-		0.01	0.005		-	-	
			Dif-in-			Dif-in-			Dif-in-
Dif (High-Low	-0.002	-0.001	-0.001	-	-0.022	-0.003	-	0.080	-0.096
Panel B: Mahalanobis 1 to 5									
High RM	-	-		-	-		-	-	
Low RM	-	-		0.01	-0.003		-	-	
Dif (High-Low	-0.002	0.009	-0.011	-	-0.005	-0.020	-	0.073	-0.089
Panel C: Mahalanobis 1 to 10									
High RM	-	-		-	-		-	-	
Low RM	-	-		0.01	-		-	-	
Dif (High-Low	-0.002	0.013	-0.015	-	-0.002	-0.023	-	0.079	-0.095

Table 12. The Fama-French Five Factors Model: The Difference-in-Differences Multivariate Approach for Buy-and-Hold Abnormal Returns (BHARs)

This table presents the Buy-and-Hold Abnormal Returns (BHARs) for the holding periods of 12, 24, 36 and 60 months after the announcement of the acquisition. BHARs is the dependent variable. Stock is a dummy variable that takes the value of one if the deal is 100% financed with equity. High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal is negative. Stock*High is the interactive term between the Stock and High dummy variables. The rest of the control variables are described in the Appendix, Panel A.

The Relative Misvaluation measure is estimated as: $RM_i = \alpha_{Bidder} - \alpha_{Target}$

The alphas (α) for bidder and target firms are estimated with the following Fama-French (2015) five factor model:

$$R_{i,t} - R_{F,t} = \alpha_i + b_i\left(R_{M,t} - R_{F,t}\right) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_{t+}e_{i,t}$$

Where R_i is bidders' and targets' monthly returns respectively for a period of 36 months prior to the acquisition announcement, R_F is the risk-free rate of return, $\left(R_{M,t} - R_{F,t}\right)$ is the market premium, SMB_t is the Small-minus-Big factor, HML_t is the High-minus-Low factor, RMW_t is robust-minus-weak profitability factor and CMA_t is the low-minus-high investment factor. All factors have been obtained from Kenneth French's website. A negative (positive) alpha would indicate overvaluation (undervaluation). BHARs and RM are estimated as discussed in the description of Table 3.

In models (2) and (3), cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on the Relative Misvaluation (RM) measure (model 2) and also based on the Relative Misvaluation (RM) measure and Bidder Misvaluation (model 3) respectively. In models (4), (5) and (6), cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on all variables as described in the Appendix. One stock acquirer is matched with one, five or ten cash acquirers, respectively. In model (7), High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal is lower than the median of the negative values of the RM measure. In model (8), High is a dummy variable that takes the value of one if the relative misvaluation (RM) of the deal belongs in the bottom quartile of the negative values of the RM measure.

In model (9), cash acquirers are matched with stock acquirers through a minimum distance Mahalanobis technique based on TargetCARs(-42,CD) and all variables as described in the Appendix, Panel C. In model (10), the matching takes place on TargetCARs(-1,+1) and all variables as described in the Appendix, Panel C. TargetCARs(-42,CD) and TargetCARs(-1,+1) are estimated as discussed in the description of Table 8.

All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. In all regressions, we control for year and industry fixed effects. Standard errors are clustered by industry and year. N denotes the number of observations.

	All	RelMis	RelMis+BidMis	1 to 1	1 to 5	1 to 10	50%	75%	T42+	T11+
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	BHARs36	BHARs36	BHARs36	BHARs36	BHARs36	BHARs36	BHARs36	BHARs36	BHARs36	BHARs36
Stock	-0.358***	-0.312***	-0.339***	-0.276***	-0.322***	-0.304***	-0.127**	-0.116**	-0.275**	-0.273**
High	-0.102	-0.104	-0.160**	-0.058	-0.135*	-0.112*	0.062	-0.037	-0.099	-0.071
Stock*High	**0.349*** **	**0.329** **	**0.378*** **	**0.280*** **	**0.349*** **	**0.327*** **	**0.208** *	**0.481** *	**0.322*** **	**0.292*** **
Cash/TA	0.478	0.196	0.332	0.411	-0.015	-0.126	0.348	0.341	0.461	0.358
Return on Equity	0.001*	0.002*	0.000	0.000	0.002	0.002	0.001	0.001	0.001	0.001
Sales Growth	-0.177	-0.233	-0.219	-0.210	0.036	0.157	-0.091	-0.142	-0.192	-0.243
Debt/Equity(-	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000	-0.000	-0.000

1)-Bid PE(-42days)-Bid	0.000	0.000	0.000	0.000	0.000	0.000	-0.000	0.000	0.000	0.000
Log(TA)	-0.017	0.010	-0.046	-0.050	-0.006	0.013	-0.057	-0.060	-0.075	-0.078
BHARs(-12,-1)	-0.108***	-0.089***	-0.078***	-0.076***	-0.073	-0.055	-0.071**	-0.067**	-0.088***	-0.065***
St.Dev.(-253,-42)-Bid	-1.175***	-6.015**	-8.079***	-8.615***	-8.268**	-7.865	-10.100***	-10.433***	-8.971***	-9.440***
Relative Size	0.083	0.137*	0.105	0.128	0.061	0.049	0.096	0.110	0.069	0.114
MTBV(-42 days)-Bid	-0.003	-0.009	-0.001	-0.005	-0.011	-0.015	-0.005	-0.002	-0.007	-0.006
Hostile	0.271	0.141	0.823	-0.479**	0.089	0.310	0.072	-0.389**	-0.229	-0.421**
Tender Offer	-0.130**	-0.133	-0.053	-0.143*	-0.144*	-0.154*	-0.160**	-0.115	-0.059	-0.139*
TarTerm	-0.015	-0.079	0.012	-0.001	-0.048	-0.060	-0.034	-0.030	-0.012	-0.043
BidLock	-0.011	-0.028	-0.058	-0.059	0.098	0.173*	-0.009	0.003	-0.012	-0.035
NoDealsinYear	-0.054	-0.114**	-0.071	-0.058	-0.129*	-0.144*	-0.047	-0.046	-0.079*	-0.068*
Constant	0.328	0.140	0.794**	0.785**	0.943*	0.792	0.855**	0.957**	1.036**	1.183***
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1554	1898	1862	1899	5630	10313	2426	2158	1904	1916
adj. R-sq	0.100	0.103	0.106	0.125	0.198	0.226	0.146	0.146	0.121	0.136

Table 13. Calendar-Time Approach - 36 Months Window

This table presents results from the following three regressions of bidder long-run returns for a window of 36 months following the acquisition announcement:

$$R_{p,t} - R_f = \alpha_p + \beta_{Mkt,p}(R_{m,t} - R_f) + \varepsilon_i$$
$$R_{p,t} - R_f = \alpha_p + \beta_{Mkt,p}(R_{m,t} - R_f) + \beta_{SMB,p}SMB_t + \beta_{HML,p}HML_t + \varepsilon_i$$
$$R_{p,t} - R_f = \alpha_p + \beta_{Mkt,p}(R_{m,t} - R_f) + \beta_{SMB,p}SMB_t + \beta_{HML,p}HML_t + \beta_{UMD,p}UMD_t + \varepsilon_i$$

Where Rp,t is the value weighted monthly return of the calendar portfolio at month t, Rf is the monthly risk-free rate of return, Rm,t is the monthly return on the market index at month t, SMBt is the monthly return on small minus large firms at month t, HMLt is the monthly return on high book-to-market minus low book-to-market firms at month t and UMBy is the monthly return on previous 12-month return winners minus previous 12-month loser firms at month t. βMkt,p, βSMB,p, βHML,p, βUMD,p are the regression parameters for each portfolio and εi is the error term. The intercept (α) measures the monthly average excess returns of acquiring

firms after controlling for the effect of the three risk factors. All factors have been obtained from Kenneth French's website.

Panel A present the results for the CAPM, Panel B for the 3 factor Fama-French model, Panel C for the 4 factor Carhart model and Panel D presents the raw return for each portfolio. The stockovervalued (stockundervalued) portfolio includes deals for which the transaction takes place 100% in equity and the bidder is classified as overvalued (undervalued) according to the Rhodes-Kropf et al. (2005) model. The cashovervalued (cashundervalued) portfolio includes deals for which the transaction takes place 100% in cash and the bidder is classified as overvalued (undervalued) according to the same model. Dif(SO-SU) captures the difference in monthly returns between stock overvalued and stock undervalued deals. Dif(CO-CU) captures the difference in monthly returns between cash overvalued and cash undervalued deals. The Dif-in-Difs captures the difference between the previous two differences [Dif(SO-SU)- Dif(CO-CU)].
All acquirers and targets are publicly traded firms listed on the major US markets. The superscripts ***, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. In all regressions, we control for year and industry fixed effects. Standard errors are clustered by industry and year. N denotes the number of observations.

Panel A: CAPM

	Stock	Stock	Dif(SO-	Cash	Cash	Dif(CO-	**Dif-in-**
α	-0.001	-0.005***	0.003	-0.001	-0.000	-0.001	**0.005**
p-value	(0.643)	(0.004)	(0.207)	(0.527)	(0.963)	(0.558)	**(0.156)**
β_{Mkt}	1.298***	0.989***	0.311***	1.145***	0.944***	0.202***	0.115
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.114)
N	380	391	379	391	395	391	379
adj. R-sq	0.554	0.642	0.059	0.687	0.608	0.054	0.004

Panel B: 3 factor Fama-French model

	Stock	Stock	Dif(SO-	Cash	Cash	Dif(CO-	**Dif-in-**
α	-0.001	-0.006***	0.005*	-0.002	-0.001	-0.001	**0.006***
p-value	(0.620)	(0.000)	(0.067)	(0.298)	(0.537)	(0.671)	**(0.075)**
β_{Mkt}	1.252***	1.022***	0.234***	1.118***	0.944***	0.175***	0.067
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.373)
β_{SMB}	0.356***	0.268***	0.088	0.428***	0.321***	0.107*	-0.018
p-value	(0.000)	(0.000)	(0.325)	(0.000)	(0.000)	(0.084)	(0.867)
β_{HML}	0.059	0.508***	-	0.251***	0.326***	-0.082	-
p-value	(0.525)	(0.000)	(0.000)	(0.000)	(0.000)	(0.218)	(0.001)
N	380	391	379	391	395	391	379
adj. R-sq	0.571	0.716	0.120	0.734	0.655	0.063	0.027

Panel C: 4 factor Carhart model

	Stock	Stock	Dif(SO-	Cash	Cash	Dif(CO-	**Dif-in-**
α	0.000	-0.006***	0.006**	0.000	0.000	0.000	**0.006***
p-value	(0.918)	(0.000)	(0.030)	(0.888)	(0.976)	(0.959)	**(0.078)**
β_{Mkt}	1.198***	1.002***	0.201***	1.059***	0.912***	0.147***	0.065
p-value	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.001)	(0.397)
β_{SMB}	0.368***	0.272***	0.095	0.439***	0.327***	0.112*	-0.017
p-value	(0.000)	(0.000)	(0.285)	(0.000)	(0.000)	(0.069)	(0.870)
β_{HML}	-0.020	0.477***	-	0.160***	0.278***	-0.125*	-
p-value	(0.827)	(0.000)	(0.000)	(0.004)	(0.000)	(0.067)	(0.002)
B_{UMD}	-0.207***	-0.082**	-0.127**	-0.239***	-0.128***	-	-0.005
p-value	(0.000)	(0.014)	(0.037)	(0.000)	(0.000)	(0.008)	(0.944)
N	380	391	379	391	395	391	379
adj. R-sq	0.584	0.720	0.128	0.763	0.666	0.078	0.025

	Panel D: Raw Returns						
	Stock	Stock	Dif(SO-	Cash	Cash	Dif(CO-	**Dif-in-**
Raw	0.008**	0.007***	0.001	0.008***	0.008***	0.000	**0.001**
p-value	(0.040)	(0.000)	(0.781)	(0.000)	(0.000)	(0.885)	**(0.838)**